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Background Document for Third Third Wastes to Support 40 CFR Part 268 Land Disposal Restrictions. Final Rule. Third Third Waste Volumes, Characteristics, and Required and Available Treatment Capacity. Volume 1. Executive Summary Chapter 1 and Chapter 2

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Background Document For Third Third Wastes To Support 40 CFR Part 268 Land Disposal Restrictions

Final Rule

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Third Third Waste Volumes, Characteristics, and Required and Available Treatment Capacity

Volume I

EXECUTIVE SUMMARY
CHAPTER 1
CHAPTER 2

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FINAL RULE

THIRD THIRD WASTE VOLUMES, CHARACTERISTICS, AND REQUIRED AND AVAILABLE TREATMENT CAPACITY

Volume I

EXECUTIVE SUMMARY
CHAPTER 1
CHAPTER 2

U.S. Environmental Protection Agency
Office of Solid Waste
401 M Street, S.W.
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EXECUTIVE SUMMARY

This document supports the final rule for the Third Third of the wastes scheduled for restriction from land disposal under section 3004(m) of the Resource Conservation and Recovery Act (RCRA) as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA). It presents the estimates of the quantities of wastes that will require alternative treatment and recovery prior to land disposal. It also presents estimates of alternative treatment and recovery capacity available to manage wastes restricted from land disposal, taking into account the demands already placed on that capacity by previous land disposal restrictions.

To date, the Land Disposal Restriction Program has promulgated final rules on the land disposal (treatment or storage in waste piles; treatment, storage, or disposal in surface impoundments; and disposal in landfills, land treatment units, and underground injection) of solvent and dioxin-containing wastes, California list wastes, and wastes from the First Third and Second Third of the "scheduled" wastes. This final rule provides land disposal restrictions for waste codes not regulated under the previous rules.

Legal Background

The Hazardous and Solid Waste Amendments (HSWA) to RCRA, enacted on November 8, 1984, set basic new priorities for hazardous waste management. Land disposal, which has been the most widely used method for managing hazardous waste, is now the least preferred option. Under HSWA, the U.S. Environmental Protection Agency (EPA) must promulgate regulations restricting the land disposal of hazardous wastes according to a strict statutory schedule. As of the effective date of each regulation, land disposal of untreated wastes covered by that regulation is prohibited unless it can be demonstrated that there will be no migration of hazardous constituents from the disposal unit for as long as the waste remains hazardous.

HSWA's schedule divided hazardous wastes into three broad categories. The first category, which contained wastes restricted under regulations issued on November 7, 1986, includes generic solvent and dioxin wastes. The second category, whose final rule was issued on July 8, 1987, covers wastes originally listed by the State of California and adopted intact within HSWA. The "California list" comprises the following classes of wastes: liquid hazardous wastes with a pH of less than or equal to 2.0 (acidic corrosive wastes); all liquid hazardous wastes containing free cyanides, various metals, and polychlorinated biphenyls (PCBs) exceeding statutory concentration levels; and all wastes (liquid, sludge, or solid) containing halogenated organic compounds (HOCs) in concentrations greater than or equal to specified statutory levels. All other hazardous wastes fall into the last category, referred to as "scheduled" wastes. HSWA requires EPA to promulgate regulations for these wastes on a timetable that would restrict at least one-third of them by August 8, 1988, at least two-thirds of them by June 8, 1989, and the remainder by May 8, 1990, i.e., the First, Second, and Third Third scheduled wastes, respectively.

Under the Land Disposal Restriction Program, EPA must identify levels or methods of treatment that substantially reduce the toxicity of a waste or the likelihood of migration of hazardous constituents from the waste. Where possible, EPA prefers to define treatment in terms of performance (i.e., levels of treatment, expressed as a concentration of hazardous constituents in residuals from treatment) rather than in terms of specific treatment methods. HSWA requires, however, that levels specified in the regulations be demonstrated and available. Accordingly, EPA's standards are generally based on the performance of the best demonstrated available technology (BDAT), as documented by treatment data collected at well-designed and well-operated systems using that technology, or are based on data derived from the treatment of similar wastes that are as difficult or more difficult to treat.

The land disposal restrictions are effective immediately upon promulgation unless the Agency grants a national variance from the statutory date because of a lack of available capacity. For every waste group, EPA considers, on a national basis, both the capacity of commercially available treatment or recovery technologies and the quantity of restricted wastes currently sent to land disposal for which on-site capacity is not available. If EPA determines that adequate alternative treatment or recovery capacity is available for a particular waste or waste group, the land disposal restriction goes into effect immediately. If not, EPA establishes an alternative effective date based on the earliest date on which adequate treatment or recovery capacity will be available, or two-years, whichever is less.

Summary of Capacity Analyses for Previous Rules

Estimates of the need for, and availability of, alternative hazardous waste management capacity for previous land disposal restrictions rules are described below.

Solvents and Dioxins

EPA promulgated the first rule under the Land Disposal Restriction Program on November 7, 1986 (51 FR 40572). This rule established treatment standards expressed as concentrations in waste extracts for spent solvent wastes (F001-F005) and wastes contaminated with dioxin (F020-F023 and F026-F028). It prohibited land disposal of wastes in these categories unless they contain less than the specified concentrations.

EPA's original capacity analysis for solvent wastes, based on the RIA Mail Survey, indicated shortfalls in available capacity for wastewater treatment and incineration. The Agency therefore granted a two-year national capacity variance for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) wastes and RCRA corrective action wastes, small quantity generator wastes, and all wastes containing less than 1 percent total F001-F005 solvent constituents. When the initial analysis was later reevaluated using TSDR Survey data, however, EPA found that capacity was adequate for these wastes.

The original capacity analysis for dioxin-containing wastes showed that there was no available incineration capacity for these wastes. The November 7, 1986, rule, therefore, also granted a two-year national capacity variance for these wastes. Current capacity estimates for these wastes are unchanged.

California List Wastes

The California list defines wastes in terms of general characteristics rather than waste codes. It covers classes of wastes originally listed by the

State of California and adopted intact within HSWA, including all liquid hazardous wastes with a pH of less than or equal to 2.0 (acidic corrosive wastes), all liquid hazardous wastes containing free cyanide, metals, or PCBs in concentrations greater than or equal to limits specified in HSWA, and all hazardous wastes (liquid, sludge, or solid) containing HOCs in amounts greater than or equal to limits specified in HSWA.

EPA promulgated its final rule on the California list wastes on July 8, 1987 (52 FR 25760). For HOC wastes, EPA specified incineration as the required treatment and did not set a concentration-based limit for treatment. For PCB wastes, the Agency specified thermal treatment in accordance with 40 CFR 761.60 as the treatment standard. For acidic corrosive wastes, the Agency prohibited all land disposal of wastes with a pH of less than or equal to 2.0, but did not specify a treatment standard. The final rule did not establish prohibition levels for metal or cyanide wastes, so the prohibition limits specified in the statute took effect.

The capacity analysis for the California list rule was originally based on the RIA Mail Survey, which indicated that incineration capacity for HOC wastes was inadequate. The Agency had therefore granted a two-year national variance for HOC wastes. Capacity was found to be adequate for all other California list wastes. The HOC variance was rescinded on November 8, 1988, however, because the later capacity analysis using the TSDR Survey found incineration capacity to be adequate and the variance unnecessary.

First Third Wastes

EPA promulgated the final rule for First Third wastes on August 17, 1988. The capacity analysis conducted for First Third wastes indicated that adequate treatment capacity exists for all First Third wastes except the following:

- Petroleum refining wastes (K048, K049, K050, K051, K052), for which BDAT is sludge incineration or solvent extraction;
- High zinc (greater than or equal to 15 percent zinc) electric arc furnace dust (K061), for which BDAT is high temperature metals recovery; and

- Mercury cell chlorine production waste (K071), for which BDAT is acid leaching.

The Agency therefore granted two-year national capacity variances to all these wastes. In the case of high zinc K061 wastes, however, it required these wastes to be treated to meet the standard for low zinc wastes based on stabilization during the variance period.

Underground Injected Wastes

EPA has promulgated three final rules restricting the underground injection of certain wastes. The first final rule, promulgated on July 26, 1988, addressed solvent and dioxin wastes. Using the TSDR Survey data, EPA found that capacity was adequate for underground injected solvent wastes containing greater than or equal to 1 percent total F001-F005 solvent constituents, for which the BDAT technology was incineration; thus, no variance was granted to these wastes.

On the other hand, the TSDR Survey data indicated that alternative treatment capacity is inadequate for underground injected solvent wastes containing less than or equal to 1 percent total F001-F005 solvent constituents, for which the BDAT technology is wastewater treatment. The Agency therefore granted a national capacity variance for these wastes until August 8, 1990.

In addition, the Agency also found that no dioxin-containing wastes are being underground injected, so no alternative treatment capacity is required for these wastes, and they were not granted a capacity variance.

The second final rule, promulgated on August 16, 1988 (53 FR 30908), addressed underground injection of California list wastes and certain First Third wastes (K049-K052, K062, K071, and K104). This analysis showed inadequate alternative treatment capacity for almost all underground injected California list wastes, the only exceptions being for liquid wastes containing greater than 50 ppm PCBs and liquid and nonliquid wastes containing greater than 1,000 ppm of HOCs, all of which require incineration. It also found that alternative treatment capacity is inadequate for all underground injected First Third wastes covered by the rule. EPA therefore granted national capacity variances until August 8, 1990, for all underground injected First Third wastes and all underground injected California list wastes for which treatment capacity is inadequate.

On June 14, 1989 (54 FR 25416), EPA published its regulatory approach for underground injected First Third wastes not included in the August 16 rule. Where BDAT standards had been promulgated under the First Third final rule (August 17, 1988), the approach proposed to adopt those standards by reference.

In the case of dilute K016 (<1 percent) wastewaters, EPA found that insufficient capacity exists for treatment and therefore granted a national capacity variance. In all other cases, adequate treatment capacity exists for all underground injected First Third wastes for which BDAT treatment standards have been promulgated and EPA did not grant any other variances.

Second Third Wastes

EPA published the final rule for Second Third wastes on June 23, 1989. The capacity analysis conducted for this rule showed that sufficient capacity exists to treat all wastes that are currently land disposed in surface units. However, in order to allow time, if needed, for modifications to treatment systems, EPA delayed implementation of the cyanide standards for the electroplating wastes (F006, F007, F008, and F009) for 30 days. In addition, for heat treating wastes (F011 and F012), EPA delayed implementation of the cyanide standards until December 8, 1989, to allow time for generators to segregate these wastes for proper treatment. Between July 8, 1989, and December 8, 1989, however, heat treating wastes were subject to the cyanide standards applicable to electroplating wastes.

For underground injected Second Third wastes, the capacity analysis showed that capacity shortages exist for wastes requiring liquids combustion, steam stripping followed by biological treatment, and alkaline chlorination and chemical precipitation. Consequently, EPA granted a two-year national capacity variance to underground injected F007 wastes requiring alkaline chlorination and chemical precipitation; K009 wastes requiring steam stripping followed by biological treatment; and K011, K013, and K014 wastes requiring liquids combustion. Furthermore, in order to allow time, if needed, for modifications to treatment systems, EPA delayed implementation of the cyanide standards for the electroplating wastes (F006, F007, F008, and F009) for 30 days. In addition, for heat treating wastes (F011 and F012), EPA delayed implementation of the cyanide standards until December 8, 1989, to allow time for generators to segregate these wastes for proper treatment. Between July 8, 1989, and December 8, 1989, however, heat treating wastes will be subject to the cyanide standards applicable to electroplating wastes.

Third Third Rule

EPA is promulgating the Third Third rule of land disposal restrictions (LDRs) to set treatment standards for all Third Third wastes, including all First Third and Second Third wastes that were "soft hammered," soil and debris, multi-source leachate, and mixed radioactive wastes.

For surface-disposed wastes, the capacity analysis showed that alternative capacity shortages exist for certain wastes requiring acid leaching followed by chemical precipitation, combustion of sludges and solids, mercury retorting, thermal recovery, and vitrification. For deepwell-disposed wastes, alternative capacity shortages exist for certain wastes requiring acid leaching followed by chemical precipitation, alkaline chlorination, biological treatment followed by chemical precipitation, chemical oxidation followed by chemical precipitation, chemical oxidation followed by chromium reduction and chemical precipitation, chromium reduction followed by chemical precipitation, mercury retorting, neutralization, and wet-air oxidation. The comprehensive lists of surface-disposed and deepwell-disposed wastes receiving variances are found in Table 1 and Table 2.

For soil and debris, there is not enough treatment capacity for wastes whose BDAT is based on incineration, inorganic solids debris treatment, mercury retorting and vitrification. Therefore, EPA is granting a national capacity variance for all soil and debris whose BDAT is based on these technologies.

Table 1 - Summary of National Capacity Variance for Surface Land-Disposed Wastes[1]

Required Alternative Treatment Technology	Waste Code/Physical Form	
Acid Leaching and Chemical Precipitation	D009	Low Mercury Nonwastewater
	K106	Low Mercury Nonwastewater
	P065	Low Mercury Nonwastewater
	P092	Low Mercury Nonwastewater
	U151	Low Mercury Nonwastewater
Combustion of Sludge/Solids	F039[2]	Nonwastewater
	K048	Nonwastewater
	K049	Nonwastewater
	K050	Nonwastewater
	K051	Nonwastewater
	K052	Nonwastewater
Mercury Retorting	D009	High Mercury Nonwastewater
	K106	High Mercury Nonwastewater
	P065	High Mercury Nonwastewater
	P092	High Mercury Nonwastewater
	U151	High Mercury Nonwastewater
Secondary Smelting Storage Area	D008	Lead-Acid Materials Before Secondary Smelting
Thermal Recovery	P087	Wastewater/Nonwastewater
Vitrification	D004	Nonwastewater
	K031	Nonwastewater
	K084	Nonwastewater
	K101	Nonwastewater
	K102	Nonwastewater
	P010	Nonwastewater
	P011	Nonwastewater
	P012	Nonwastewater
	P036	Nonwastewater
	P038	Nonwastewater
	U136	Nonwastewater

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[1] EPA is granting these wastes a two-year national capacity variance, except for K048, K049, K050, K051, and K052 petroleum-refining nonwastewaters. EPA is granting K048 to K052 petroleum-refining nonwastewaters a six month national capacity variance. This tables does not include mixed radioactive wastes, which are receiving a national capacity variance for all treatment technologies.

[2] Multi-source leachate.

Table 2 - Summary of Two-Year National Capacity Variance for Underground Injected Wastes

Required Alternative Treatment Technology	Waste Code/Physical Form	
Acid Leaching Followed By Chemical Precipitation	D009	Low Mercury Nonwastewater
Alkaline Chlorination	D003[1]	Wastewater/Nonwastewater
Chemical Oxidation Followed By Chemical Precipitation	D003[2]	Wastewater/Nonwastewater
Chemical Oxidation Followed By Chromium Reduction Followed By Chemical Precipitation	D003[3]	Wastewater/Nonwastewater
Chromium Reduction Followed By Chemical Precipitation	D007	Wastewater/Nonwastewater
Mercury Retorting	D009	High Mercury Nonwastewater
Neutralization	D002[4]	Wastewater/Nonwastewater
Wet-Air Oxidation	K011	Wastewater
	K013	Wastewater
	K014	Wastewater/Nonwastewater
Wet-Air Oxidation Followed By Carbon Adsorption, Followed By Chemical Precipitation; Biological Treatment Followed By Chemical Precipitation	F039[5]	Wastewater

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[1] D003 (Cyanides).

[2] D003 (Sulfides).

[3] D003 (Explosives, Water Reactives, Other Reactives).

[4] Deepwell injected D002 liquids with a pH less than 2.0 must meet the California list treatment standards on August 8, 1990.

[5] Multi-Source Leachate.

For multi-source leachate, the capacity analysis shows that there is a lack of capacity for the promulgated treatment technologies for surface-disposed nonwastewaters and deepwell-disposed wastewaters containing organics (i.e., combustion of sludge/solids, wet air oxidation followed by carbon adsorption followed by chemical precipitation, and biological treatment followed by chemical precipitation). EPA is granting a national capacity variance to surface-disposed multi-source leachate organic nonwastewaters and deepwell-disposed multi-source leachate wastewaters.

For mixed radioactive wastes, EPA is granting a national capacity variance for all wastes being surface-disposed. EPA is not granting a variance for mixed radioactive wastes that are underground injected, because EPA currently has no information on these wastes.

Data Sources for the Current Capacity Analysis

TSDR Survey

The TSDR Survey was originally mailed to approximately 2,400 RCRA-permitted or interim status facilities in August 1987. Since that date, an additional 225 new or previously overlooked facilities have been included. To date, over 2,500 surveys have been received, reviewed for completeness and accuracy, and analyzed.

Generator Survey

The National Survey of Hazardous Waste Generators (the Generator Survey) was designed to gather data on waste generation and exempt hazardous waste treatment and recovery capacity, and it includes detailed hazardous waste characterization data. For this final rule, these data were used primarily to verify generation of some large volume wastes and unique waste mixtures reported as land disposed.

Leachate Data

The Agency used two primary data sources to perform the capacity analysis for multi-source leachate: the TSDR Survey and the Generator Survey. The

Agency analyzed data on the volumes of multi-source leachate generated and managed, including data on the facility schematics. In addition to data included in the surveys, the Agency used additional data from the hazardous waste management industry submitted as part of the leachate study plan. (Appendix A describes these data sources in further detail.)

Radioactive Waste Data

The Department of Energy (DOE) provided data on the generation and treatment of mixed radioactive wastes at 21 DOE facilities. Information sources for non-DOE mixed radioactive wastes included the TSDR Survey, Generator Survey, published studies of mixed radioactive wastes, surveys and reports for states and interstate compacts for managing low-level mixed radioactive wastes, and telephone contacts with government representatives and industry officials. (Appendix B describes these data sources).

Methodology for Capacity Analysis

To evaluate the adequacy of alternative treatment capacity for specific waste categories, EPA first puts restricted wastes into "treatability groups" that require similar treatment or management practices; for instance, all wastes requiring sludge incineration would be placed in the same treatability group. Where wastes present particular problems in treatment, the Agency may identify "treatment trains" of multiple technologies operating in sequence. Volumes of wastes in each treatability group are adjusted to reflect the November 1988 deadline regarding minimum technology requirements for surface impoundments. The net total volume of currently land disposed hazardous waste requiring alternative treatment capacity becomes the required capacity for that treatability group. EPA then assigns the volumes of waste in each treatability group to treatment technologies or treatment trains.

Determinations of available capacity take several factors into account. Some treatment processes will generate various treatment residuals, which then have to be assigned to, and accounted for within, other treatability groups. Available capacity--the difference between currently utilized capacity and the total capacity of the treatment system--must take into account the commercial status of each facility managing waste within a treatability group:

- Available treatment capacity at on-site facilities used exclusively by the waste generator cannot be considered available to other generators;

- All commercially available capacity at commercial facilities is considered fully available to any generator.

Capacity analysis begins at the facility level and aggregates upward toward the national level, assigning available excess capacity by observing the above rules. For example, available capacity at private treatment systems applies only to wastes currently land disposed at the same site. Remaining wastes are assigned to commercial capacity.

The analysis for each regulation within the Land Disposal Restriction Program accounts for the sequential and cumulative effects of all previous regulations and for projected capacity changes after 1986, as reported in the TSDR Survey. Solvents and dioxins were considered first, followed by California list wastes, First and Second Third promulgated wastes, and finally, Third Third wastes. Available capacity has been assigned first to all affected surface disposed wastes and then to all underground injected wastes. EPA sets this priority because it believes that land disposal in surface units may represent a greater threat to human health and the environment than does underground injection.

Results of the Capacity Analysis

For the types of treatment and recovery needed to meet Third Third rule standards, Table 3 shows the commercial capacity remaining to manage all Third Third wastes. This takes into account the capacity already allocated to other wastes under all previous land disposal restrictions. Remaining capacity for Third Third wastes is estimated by subtracting requirements for previously restricted wastes from the capacity currently available. This table represents the most current data available to the Agency.

In the Third Third proposed rule, EPA determined that 25 million gallons of First Third Wastes required alkaline chlorination followed by chemical precipitation. This estimate was based on an analysis performed for the

TABLE 3 DETERMINATION OF AVAILABLE COMMERCIAL CAPACITY FOR THIRD THIRD WASTES*

(MILLIONS OF GALLONS/YEAR)

TECHNOLOGY	1990 AVAILABLE CAPACITY	REQUIRED CAPACITY BY:								CAPACITY FOR THIRD THIRDS
		SOLVENTS RULE	CA LIST HOCs (EXCLUDING THIRD THIRD HOCs)	SOLVENTS UIW	FIRST THIRDS	FIRST THIRD UIW	CA LIST HOCs UIW (EXCLUDING THIRD THIRD HOCs)	SECOND THIRD WASTE	SECOND THIRD WASTE UIW	
Acid leaching followed by chemical precipitation	0	0	0	0	0*	0*	0	0	0	0
Alkaline chlorination	7	0	0	0	0	0	0	0	0	7
Alkaline chlorination followed by chemical precipitation	17	<1	0	0	6	0	0	5	0*	6
Biological treatment	47	0	0	0	0	<1	0	<1	0	47
Biological treatment followed by chemical precipitation	14	0	0	0	0	0	0	0	0	14
Chemical oxidation followed by chemical precipitation	28	0	0	0	0	0	0	0	0	28
Chemical oxidation followed by chromium reduction followed by chemical precipitation	2	0	0	0	0	0	0	0	0	2
Chemical precipitation	339	0	0	0	0	0	0	<1	0	339
Chromium reduction followed by chemical precipitation	142	<1	0	0	46	0*	0	<1	0	96
Combustion of liquids	328	2	0	57	<1	<1	<1	<1	32*	237
Combustion of sludge/solids	81	23	<1	0	8*	0	0	9	0	41
Mercury retorting	<1	0	0	0	0	0	0	0	0	<1
Neutralization	36	0	0	0	0	0	0*	0	0	36
Secondary lead smelting	37	0	0	0	0	0	0	0	0	37
Stabilization	750	4	0	0	263	0	0	4	1	478
Thermal recovery	0	0	0	0	0	0	0	0	0	0
Thermal recovery of cadmium batteries	<1	0	0	0	0	0	0	0	0	<1
Vitrification	0	0	0	0	0	0	0	0	0	0
Wet-air oxidation	<1	0	0	0	0	0	0	0	0	<1
Wet-air oxidation followed by carbon adsorption	<1	0	0	0	0	0	0	0	0	<1

Note: Quantities of less than one million gallons are neither added nor subtracted from available/required quantities.

*Volume of waste not granted a variance. Total regulated volume requiring the specified technology includes reported volume plus volumes granted a 2-year national capacity variance.

Second Third final rule to determine the volume of generated F006 wastes that may exceed the promulgated cyanide standards and therefore require treatment for cyanides. An analysis of the TSDR Survey data for the Second Third final rule, showed that only 4 percent of F006 wastes that were genreated at TSDR facilities may, as a worst-case scenario, contain cyanide concentrations above the revised standards. Generator Survey data indicated that less than 2 percent of the volume of F006 at generator facilities have a cyanide concentration above the treatment standard or had unknown concentration levels. In addition to analyzing the TSDR and Generator Survey data set, EPA also reviewed F006 data submitted by several commenters during the public comment period for the Second Third rule. One commenter submitted data indicating that only 9 percent of 88 waste stream samples from a variety of generators had total cyanide concentrations above the revised treatment cyanide. The second commenter's data showed that only 4 percent (2 out of 47 samples) had cyanide concentrations above the revised treatment standard. Based on this data, EPA assumed for a worst-case analysis, for the Second Third final rule and the Third Third proposed rule, that approximately ten percent of cyanide waste streams would require treatment. For the Third Third final rule, EPA has revised the baseline estimate from ten percent to four percent. Consequently, the volume of First Third wastes requiring alkaline chlorindation followed by chemical precipitation capacity has been revised.

Using the remaining capacity for Third Third wastes as a baseline, Table 4 shows the capacity needs for all Third Third wastes that are not underground injected (including leachate), contaminated soils or debris, or mixed radioactive wastes. This table shows that insufficient capacity currently exists for some volumes of surface disposed Third Third wastes. Insufficient capacity exists for the following technologies: acid leaching followed by chemical precipitation, sludge/solid combustion, mercury retorting, thermal recovery, and vitrification.[1] Consequently, EPA is granting variances to the following surface-disposed wastes: D009, K106, P065, P092, and U151 low mercury nonwastewaters; F039 multi-source leachate nonwastewaters; K048, K049, K050, K051, and K052 nonwastewaters; D009, K106,

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[1] Volumes of wastes assigned to these technologies have either technology-based or concentration-based treatment standards. Although wastes with concentration-based standards can be treated with other technologies, for capacity analysis purposes, volumes were assigned to these BDATs.

Table 4

Required Alternative Commercial Treatment/Recycling Capacity for Surface-Disposed Wastes[1] (millions of gallons/yr.)

Technology	Available Capacity	Required Capacity	Variance
Acid Leaching Followed by Chemical Precipitation	0	3	YES
Alkaline Chlorination	7	6	NO
Alkaline Chlorination Followed By Chemical Precipitation	6	2	NO
Biological Treatment	47	<1	NO
Biological Treatment Followed By Chemical Precipitation	14	<1	NO
Chemical Oxidation Followed By Chemical Precipitation	28	7	NO
Chemical Oxidation Followed By Chromium Reduction and Chemical Precipitation	2	2	NO
Chemical Precipitation	339	25	NO
Chromium Reduction Followed By Chemical Precipitation	96	85	NO
Combustion of Liquids	237	16	NO
Combustion of Sludge/Solids	41	213	YES

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[1] This table does not include mixed radioactive wastes, which are receiving a national capacity variance for all applicable treatment technologies.

Table 4 (continued)

Required Alternative Commercial Treatment/Recycling Capacity for Surface-Disposed Wastes (millions of gallons/yr.)

Technology	Available Capacity	Required Capacity	Variance
Mercury Retorting	<1	3	YES
Neutralization	36	22	NO
Secondary Lead Smelting	37	2	NO
Stabilization	478	158	NO
Thermal Recovery[2]	0	<1	YES
Thermal Recovery of Cadmium Batteries	<1	<1	NO
Vitrification	0	22	YES

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[2] Excluding Secondary Smelting of lead wastes.

P065, P092, and U151 high mercury nonwastewaters; D008 lead acid batteries in storage areas prior to secondary smelting; P087 wastewaters and nonwastewaters; and D004, K031, K084, K101, K102, P010, P011, P012, P036, P038, and U136 nonwastewaters. EPA is not granting a national capacity variance for any other surface-disposed Third Third wastes.

Table 5 allocates capacity to underground injected Third Third wastes after removing capacity for surface-disposed wastes that are not receiving a variance. The table shows shortfalls in available capacity for acid leaching followed by chemical precipitation, alkaline chlorination, biological treatment followed by chemical precipitation, chemical oxidation followed by chemical precipitation, chemical oxidation followed by chromium reduction and chemical precipitation, chromium reduction followed by chemical precipitation, mercury retorting, neutralization, and wet-air oxidation. As a result, EPA is granting a two-year national capacity variance to the following underground injected wastes: D003 cyanide wastewaters and nonwastewaters; D003 sulfide wastewaters and nonwastewaters; D003 explosive/reactive wastewaters and nonwastewaters; D007 wastewaters and nonwastewaters; D009 nonwastewaters; D002 wastewaters and nonwastewaters; K011 and K013 wastewaters, and K014 wastewaters and nonwastewaters; and F039 multisource leachate wastewaters. EPA is not granting a national capacity variance to any other underground injected Third Third wastes.

Table 6 allocates capacity to Third Third soil and debris wastes after removing capacity for both surface-disposed and underground-injected wastes. The table shows shortfalls in available capacity for incineration, inorganic solids debris treatment, mercury retorting, and vitrification. As a result, EPA is granting an extension of the effective date for certain First, Second,and Third Third contaminated soil and debris for which the treatment standards today are based on incineration, inorganic solids debris treatment, mercury retorting or vitrification.

Table 7 shows available treatment capacity for mixed radioactive wastes and the quantities requiring treatment. The table shows shortfalls for available capacity for stabilization, surface deactivation followed by encapsulation, combustion, incineration followed by ash stabilization,

Table 5

Required Alternative Commercial Treatment/Recycling Capacity for Deepwell-Disposed Wastes (millions of gallons/yr.)

Technology	Available Capacity	Required Capacity	Variance
Acid Leaching Followed By Chemical Precipitation	0	<1	YES
Alkaline Chlorination	1	48	YES
Alkaline Chlorination Followed By Chemical Precipitation	4	<1	NO
Biological Treatment	47	2	NO
Biological Treatment Followed By Chemical Precipitation	13	15	YES
Chemical Oxidation Followed By Chemical Precipitation	21	1,684	YES
Chemical Oxidation Followed By Chromium Reduction and Chemical Precipitation	<1	195	YES
Chemical Precipitation	314	119	NO
Chromium Reduction Followed By Chemical Precipitation	9	239	YES
Combustion of Liquids	219	54	NO
Mercury Retorting	<.01	<.02	YES
Neutralization	14	1,638	YES
Stabilization	305	4	NO
Wet-Air Oxidation	<1	1,027	YES
Wet-Air Oxidation Followed By Carbon Adsorption	<1	<1	NO

Table 6

Required Alternative Commercial Treatment/Recycling Capacity for Soil and Debris Wastes (millions of gallons/yr.)

Technology	Available Capacity	Required Capacity	Variance
Alkaline Chlorination	<1	<1	NO
Beryllium Recovery	<1	<1	NO
Chemical Oxidation Followed By Chromium Reduction and Chemical Precipitation	<1	<1	NO
Chromium Reduction and Chemical Precipitation	4	2	NO
Incineration of Sludge/Solids	0	8	YES
Inorganic Solids Debris Treatment	0	5	YES
Mercury Retorting	<1	4	YES
Neutralization	14	<1	NO
Secondary Smelting	35	<1	NO
Stabilization	301	12	NO
Vitrification	0	<1	YES

Table 7

Summary of Capacity Analysis for Mixed Radioactive Wastes

Technology	Available Capacity (million gal/yr)	Required Capacity (million gal/yr)	Variance
Stabilization	2.8	63.6	YES
Macroencapsulation	0	<0.2	YES
Combustion			
- Liquids	0	<0.1	YES
- Sludge/solids	0	1.6	YES
Neutralization	0.2	26.2	YES
Vitrification	0	14	YES
Alkaline Chlorination	0	0.8	YES
Alkaline Chlorination and Chemical Precipitation	0	0.5	YES
Alkaline Chlorination and Stabilization of Metals	0	8.1	
Treatment of Reactives	0	<0.1	YES
Metals Recovery	0	0.2	YES
Amalgamation	0	<0.1	YES
Chromium Reduction and Chemical Precipitation	0	<0.1	YES
Chemical Precipitation	0	<0.1	YES
Sulfide Precipitation	0	51.6	
Soil and Debris	0	193	YES

neutralization, vitrification, alkaline chlorination, alkaline chlorination followed by chemical precipitation, alkaline chlorination followed by stabilization of metals, treatment of reactives, metals recovery, amalgamation with zinc, chromium reduction followed by chemical precipitation, chemical precipitation, sulfide precipitation, and treatment of soil and debris contaminated with mixed radioactive wastes. As a result, EPA is promulgating a two-year national capacity variance to all surface-disposed mixed radioactive wastes. Because EPA has no information on the underground injection of mixed radioactive wastes, EPA is not promulgating a national capacity variance to those mixed radioactive wastes that are underground injected.

Table 8 further summarizes the results of Tables 4 and 5 by waste code, indicating the capacity needs for each surface disposed or underground injected waste, and whether or not available capacity is adequate.

Table 8. Summary of Capacity Analysis for Third Third Wastes by Waste Code

Waste streams other than soil and debris

Waste Code	Surface disposed volume requiring alternative capacity (million gal/yr)	Adequate alternative capacity available (yes/no)	Underground injected volume requiring alternative capacity (million gal/yr)	Adequate alternative capacity available (yes/no)	Total (million) gal/yr)
D001a	19.6	yes	6.9	yes	26.5
D001b	<0.1	yes	0	yes	<0.1
D002c	25.5	yes	1,924.5	no	1,950.0
D002d	0	yes	0	no	0
D003e	1.4	yes	54.6	no	56.0
D003f	6.7	yes	1,593.5	no	1,600.2
D003g	1.2	yes	97.6	no	98.8
D004	12.8	no	10.0	yes	22.8
D005	16.4	yes	1.3	yes	17.7
D006h	16.3	yes	1.6	yes	17.9
D006i	<0.1	yes	0	yes	0
D007	118.4	yes	201.2	no	319.6
D008j	72.5	yes	3.7	yes	75.7
D008k	0.6	no	0	yes	0.6
D009	4.1	no	1.2	no	5.2
D010	2.0	yes	95.2	yes	97.3
D011	2.5	yes	0.3	yes	2.8
D012	0.5	yes	2.3	yes	2.8
D013	0.4	yes	2.3	yes	2.8
D014	1.9	yes	2.4	yes	4.3
D015	<0.1	yes	2.3	yes	2.3
D016	0.2	yes	2.3	yes	2.6
D017	0.4	yes	2.3	yes	2.8
F002	0	yes	0	yes	0
F005	0	yes	0	yes	0
F006l	1.6	yes	0.5	yes	2.1
F006m	0	yes	3.0	yes	3.0
F006n	18.8	yes	1.5	yes	20.3
F019	12.6	yes	<0.1	yes	12.6
F024	<0.1	yes	0	yes	<0.1
F025	0	yes	0	yes	0
F039o	46.2	no	15.1	no	61.3
K002	0.2	yes	0.1	yes	0.4
K003	0.2	yes	0	yes	0.2
K004	0.1	yes	0	yes	0.1
K005	0.1	yes	0	yes	0.1
K006	0.2	yes	0	yes	0.2
K007	0	yes	0	yes	0
K008	0	yes	0	yes	0
K011	0	yes	433.2	no	433.2
K013	0	yes	407.2	no	407.2
K014	0	yes	131.0	no	131.0
K015	0	yes	0	yes	0
K017	<0.1	yes	0	yes	<0.1
K021	<0.1	yes	0	yes	<0.1
K022	0	yes	0	yes	0
K025	0	yes	0	yes	0
K026	0	yes	0	yes	0
K028	0	yes	0	yes	0
K029	0	yes	0	yes	0
K031	0.6	no	1.1	yes	1.7
K032	0	yes	<0.1	yes	<0.1
K033	0	yes	0	yes	0
K034	0	yes	0	yes	0
K035	<0.1	yes	0	yes	<0.1
K036	0	yes	0	yes	0
K037	0	yes	0	yes	0
K041	0	yes	0	yes	0
K041	0	yes	0	yes	0
K042	0	yes	0	yes	0
K044	0	yes	0	yes	0
K045	0	yes	0	yes	0
K046	0	yes	0	yes	0

Table 8 (continued). Summary of Capacity Analysis for Third Third Wastes by Waste Code

Waste streams other than soil and debris					
Waste Code	Surface disposed volume requiring alternative capacity (million gal/yr)	Adequate alternative capacity available (yes/no)	Underground injected volume requiring alternative capacity (million gal/yr)	Adequate alternative capacity available (yes/no)	Total (million) gal/yr)
K042	0	yes	0	yes	0
K044	0	yes	0	yes	0
K045	0	yes	0	yes	0
K046	0	yes	0	yes	0
K047	0	yes	0	yes	0
K048	37.0	no	-	-	37.0
K049	31.8	no	-	-	31.7
K050	11.8	no	-	-	11.8
K051	78.2	no	-	-	78.2
K052	12.5	no	-	-	12.5
K060	0	yes	0	yes	0
K061	0	yes	0	yes	0
K069	<0.1	yes	0	yes	<0.1
K071	0	yes	0	yes	0
K073	<0.1	yes	0	yes	<0.1
K083	<0.1	yes	5.1	yes	5.1
K084	0.2	no	0	yes	0.2
K085	0.1	yes	0	yes	0.1
K086	0	yes	0.2	yes	0.2
K095	0	yes	0	yes	0
K096	0	yes	0	yes	0
K097	0	yes	<0.1	yes	<0.1
K098	0	yes	0	yes	0
K100	0	yes	0	yes	0
K101	0	no	0	yes	0
K102	0	no	0	yes	0
K105	<0.1	yes	0	yes	<0.1
K106p	0.4	no	0	yes	0.4
K106q	0	no	0	yes	0
P001	<0.1	yes	0	yes	<0.1
P002	<0.1	yes	0	yes	<0.1
P003	<0.1	yes	0	yes	<0.1
P004	<0.1	yes	0	yes	<0.1
P005	<0.1	yes	<0.1	yes	<0.1
P006	<0.1	yes	0	yes	<0.1
P007	0	yes	0	yes	0
P008	0	yes	0	yes	0
P009	0	yes	0	yes	0
P010	<0.1	no	0	yes	<0.1
P011	<0.1	no	<0.1	yes	<0.1
P012	<0.1	no	0	yes	<0.1
P013	0	yes	0	yes	0
P014	<0.1	yes	0	yes	<0.1
P015	<0.1	yes	0	yes	<0.1
P016	0	yes	0	yes	0
P017	0	yes	0	yes	0
P018	<0.1	yes	0	yes	<0.1
P020	<0.1	yes	0.1	yes	0.1
P022	<0.1	yes	0	yes	<0.1
P023	0	yes	0	yes	0
P024	<0.1	yes	0	yes	<0.1
P026	0	yes	0	yes	0
P027	0	yes	0	yes	0
P028	<0.1	yes	0	yes	<0.1
P031	<0.1	yes	0	yes	<0.1
P033	0	yes	0	yes	0
P034	0	yes	0	yes	0
P036	0	no	0	yes	0
P037	<0.1	yes	0	yes	<0.1

Table 8 (continued). Summary of Capacity Analysis for Third Third Wastes by Waste Code

Waste streams other than soil and debris

Waste Code	Surface disposed volume requiring alternative capacity (million gal/yr)	Adequate alternative capacity available (yes/no)	Underground injected volume requiring alternative capacity (million gal/yr)	Adequate alternative capacity available (yes/no)	Total (million) gal/yr)
P038	0	no	0	yes	0
P042	0	yes	0	yes	0
P045	0	yes	0	yes	0
P046	0	yes	0	yes	0
P047	<0.1	yes	0	yes	<0.1
P048	<0.1	yes	0.1	yes	0.1
P049	0	yes	0	yes	0
P050	<0.1	yes	0.4	yes	0.4
P051	<0.1	yes	<0.1	yes	<0.1
P054	0	yes	0	yes	0
P056	0	yes	<0.1	yes	<0.1
P057	0	yes	<0.1	yes	<0.1
P058	<0.1	yes	<0.1	yes	<0.1
P059	<0.1	yes	0.4	yes	0.4
P060	0	yes	0	yes	0
P064	<0.1	yes	0	yes	<0.1
P065	0	no	0	yes	0
P066	<0.1	yes	0	yes	<0.1
P067	<0.1	yes	0	yes	<0.1
P068	0	yes	0	yes	0
P069	<0.1	yes	0.1	yes	0.1
P070	<0.1	yes	0	yes	<0.1
P072	0	yes	0	yes	0
P073	<0.1	yes	0	yes	<0.1
P075	<0.1	yes	<0.1	yes	<0.1
P076	0	yes	0	yes	0
P077	<0.1	yes	0	yes	<0.1
P078	0	yes	0	yes	0
P081	<0.1	yes	0	yes	<0.1
P082	0	yes	0	yes	0
P084	0	yes	0	yes	0
P087	<0.1	no	0	yes	<0.1
P088	<0.1	yes	0	yes	<0.1
P092	<0.1	no	0	yes	<0.1
P093	<0.1	yes	0	yes	<0.1
P095	0	yes	0	yes	0
P096	0	yes	0	yes	0
P099	0	yes	0	yes	0
P101	0	yes	0	yes	0
P102	0	yes	<0.1	yes	<0.1
P103	0	yes	0	yes	0
P104	0	yes	0	yes	0
P105	<0.1	yes	0	yes	<0.1
P108	<0.1	yes	0	yes	<0.1
P110	0	yes	0	yes	0
P112	0	yes	0	yes	0
P113	0	yes	0	yes	0
P114	0	yes	0	yes	0
P115	<0.1	yes	0	yes	<0.1
P116	0	yes	0	yes	0
P118	0	yes	0	yes	0
P119	<0.1	yes	0	yes	<0.1
P120	<0.1	yes	0	yes	<0.1
P122	0	yes	<0.1	yes	<0.1
P123	<0.1	yes	0	yes	<0.1
U001	<0.1	yes	0.5	yes	0.5
U002	<0.1	yes	0.1	yes	0.1
U003	<0.1	yes	0	yes	<0.1
U004	<0.1	yes	0	yes	<0.1

Table 8 (continued). Summary of Capacity Analysis for Third Third Wastes by Waste Code

	Waste streams other than soil and debris				
Waste Code	Surface disposed volume requiring alternative capacity (million gal/yr)	Adequate alternative capacity available (yes/no)	Underground injected volume requiring alternative capacity (million gal/yr)	Adequate alternative capacity available (yes/no)	Total (million) gal/yr)
U005	<0.1	yes	0	yes	<0.1
U006	<0.1	yes	0	yes	<0.1
U007	<0.1	yes	0.1	yes	0.1
U008	<0.1	yes	0.1	yes	0.1
U009	<0.1	yes	<0.1	yes	<0.1
U010	<0.1	yes	0	yes	<0.1
U011	0	yes	0	yes	0
U012	<0.1	yes	0.1	yes	0.1
U014	<0.1	yes	0	yes	<0.1
U015	0	yes	0	yes	0
U016	0	yes	0	yes	0
U017	0	yes	0	yes	0
U018	0	yes	0	yes	0
U019	<0.1	yes	0.8	yes	0.8
U020	0	yes	0	yes	0
U021	<0.1	yes	0	yes	<0.1
U022	<0.1	yes	0	yes	<0.1
U023	0	yes	0	yes	0
U024	0	yes	0	yes	0
U025	0	yes	0	yes	0
U026	0	yes	0	yes	0
U027	0	yes	0	yes	0
U029	<0.1	yes	0	yes	<0.1
U030	<0.1	yes	0	yes	<0.1
U031	<0.1	yes	0.1	yes	0.1
U032	<0.1	yes	<0.1	yes	<0.1
U033	0	yes	0	yes	0
U034	0	yes	<0.1	yes	<0.1
U035	0	yes	0	yes	0
U036	<0.1	yes	0	yes	<0.1
U037	<0.1	yes	<0.1	yes	<0.1
U038	0	yes	0	yes	0
U039	<0.1	yes	0	yes	<0.1
U041	0	yes	0	yes	0
U042	0	yes	0	yes	0
U043	<0.1	yes	0	yes	<0.1
U044	<0.1	yes	0.1	yes	0.1
U045	0	yes	<0.1	yes	<0.1
U046	0	yes	0	yes	0
U047	<0.1	yes	0	yes	<0.1
U048	<0.1	yes	0	yes	<0.1
U049	0	yes	0	yes	0
U050	0	yes	0	yes	0
U051	0.1	yes	0	yes	0.1
U052	<0.1	yes	0	yes	<0.1
U053	0	yes	0	yes	0
U055	0.2	yes	0.1	yes	0.3
U056	<0.1	yes	<0.1	yes	<0.1
U057	<0.1	yes	0	yes	<0.1
U059	0	yes	0	yes	0
U060	0	yes	0	yes	0
U061	<0.1	yes	0	yes	<0.1
U062	0	yes	0	yes	0
U063	0	yes	0	yes	0
U064	0	yes	0	yes	0
U066	<0.1	yes	0	yes	<0.1
U067	<0.1	yes	0	yes	<0.1
U068	0	yes	0	yes	0
U070	<0.1	yes	0.1	yes	0.1

Table 8 (continued). Summary of Capacity Analysis for Third Third Wastes by Waste Code

Waste streams other than soil and debris					
Waste Code	Surface disposed volume requiring alternative capacity (million gal/yr)	Adequate alternative capacity available (yes/no)	Underground injected volume requiring alternative capacity (million gal/yr)	Adequate alternative capacity available (yes/no)	Total (million) gal/yr)
U071	<0.1	yes	0	yes	<0.1
U072	0.2	yes	0	yes	0.2
U073	<0.1	yes	0	yes	<0.1
U074	0	yes	<0.1	yes	<0.1
U075	<0.1	yes	0	yes	<0.1
U076	<0.1	yes	0	yes	<0.1
U077	<0.1	yes	0	yes	<0.1
U078	<0.1	yes	0	yes	<0.1
U079	<0.1	yes	0	yes	<0.1
U080	2.7	yes	2.8	yes	5.4
U081	<0.1	yes	0	yes	<0.1
U082	<0.1	yes	0	yes	<0.1
U083	<0.1	yes	0	yes	<0.1
U084	0	yes	0	yes	0
U085	0	yes	0	yes	0
U086	0	yes	0	yes	0
U089	0	yes	0	yes	0
U090	0	yes	0	yes	0
U091	0	yes	0	yes	0
U092	<0.1	yes	0	yes	<0.1
U093	<0.1	yes	0	yes	<0.1
U094	0	yes	0	yes	0
U095	0	yes	0	yes	0
U096	0	yes	0	yes	0
U097	0	yes	0	yes	0
U098	0	yes	0	yes	0
U099	0	yes	0	yes	0
U101	<0.1	yes	0	yes	<0.1
U103	<0.1	yes	<0.1	yes	<0.1
U105	<0.1	yes	0.1	yes	0.1
U106	<0.1	yes	0.1	yes	0.1
U107	0	yes	0	yes	0
U108	<0.1	yes	0	yes	<0.1
U109	<0.1	yes	0	yes	<0.1
U110	0	yes	0	yes	0
U111	0	yes	0	yes	0
U112	<0.1	yes	<0.1	yes	<0.1
U113	0	yes	<0.1	yes	<0.1
U114	<0.1	yes	0	yes	<0.1
U115	0	yes	8	yes	8
U116	<0.1	yes	0	yes	<0.1
U117	<0.1	yes	0	yes	<0.1
U118	<0.1	yes	<0.1	yes	<0.1
U119	<0.1	yes	0	yes	<0.1
U120	<0.1	yes	0	yes	<0.1
U121	<0.1	yes	0	yes	<0.1
U122	<0.1	yes	0.1	yes	0.1
U123	<0.1	yes	0	yes	<0.1
U124	0	yes	0	yes	0
U125	<0.1	yes	0	yes	<0.1
U126	<0.1	yes	0	yes	<0.1
U127	<0.1	yes	0	yes	<0.1
U128	0	yes	0	yes	0
U129	<0.1	yes	0	yes	<0.1
U130	0	yes	0	yes	0
U131	0.1	yes	0	yes	0.1
U132	0	yes	0	yes	0
U133	<0.1	yes	0.1	yes	0.1
U134	<0.1	yes	0.2	yes	0.2

Table 8 (continued). Summary of Capacity Analysis for Third Third Wastes by Waste Code

	Waste streams other than soil and debris				
Waste Code	Surface disposed volume requiring alternative capacity (million gal/yr)	Adequate alternative capacity available (yes/no)	Underground injected volume requiring alternative capacity (million gal/yr)	Adequate alternative capacity available (yes/no)	Total (million) gal/yr)
U135	0	yes	0	yes	0
U136	0	no	0	yes	0
U137	0	yes	0	yes	0
U138	0	yes	0.1	yes	0.1
U140	<0.1	yes	1.0	yes	1.0
U141	0	yes	0	yes	0
U142	<0.1	yes	0	yes	<0.1
U143	0	yes	0	yes	0
U144	<0.1	yes	0	yes	<0.1
U145	0	yes	0	yes	0
U146	<0.1	yes	0	yes	<0.1
U147	<0.1	yes	<0.1	yes	<0.1
U148	<0.1	yes	0	yes	<0.1
U149	<0.1	yes	0	yes	<0.1
U150	0	yes	0	yes	0
U151r	<0.1	no	0.1	yes	0.1
U151s	0	no	0	yes	0
U152	0	yes	0	yes	0
U153	0	yes	0	yes	0
U154	<0.1	yes	0.3	yes	0.4
U155	0	yes	0	yes	0
U156	<0.1	yes	0	yes	<0.1
U157	0	yes	0.1	yes	0.1
U158	0.3	yes	0	yes	0.3
U159	<0.1	yes	<0.1	yes	<0.1
U160	0	yes	<0.1	yes	<0.1
U161	<0.1	yes	0	yes	<0.1
U162	<0.1	yes	0.1	yes	0.1
U163	0	yes	0	yes	0
U164	0	yes	0	yes	0
U165	<0.1	yes	<0.1	yes	<0.1
U166	0	yes	0	yes	0
U167	<0.1	yes	0	yes	<0.1
U168	0	yes	0	yes	0
U169	<0.1	yes	0.1	yes	0.1
U170	<0.1	yes	0.3	yes	0.4
U171	0	yes	0	yes	0
U172	0	yes	0	yes	0
U173	0	yes	0	yes	0
U174	0	yes	0	yes	0
U176	0	yes	0	yes	0
U177	<0.1	yes	0	yes	<0.1
U178	0	yes	0	yes	0
U179	0	yes	0	yes	0
U180	<0.1	yes	0	yes	<0.1
U181	0	yes	0	yes	0
U182	<0.1	yes	0	yes	<0.1
U183	0	yes	0	yes	0
U184	0	yes	0	yes	0
U185	<0.1	yes	1.0	yes	1.0
U186	0	yes	0	yes	0
U187	0	yes	0	yes	0
U188	0.2	yes	0.2	yes	0.4
U189	0	yes	0	yes	0
U191	0	yes	0	yes	0
U192	<0.1	yes	0.1	yes	0.1
U193	0	yes	0	yes	0
U194	0	yes	<0.1	yes	<0.1
U196	<0.1	yes	0	yes	<0.1

Table 8 (continued). Summary of Capacity Analysis for Third Third Wastes by Waste Code

	Waste streams other than soil and debris				
Waste Code	Surface disposed volume requiring alternative capacity (million gal/yr)	Adequate alternative capacity available (yes/no)	Underground injected volume requiring alternative capacity (million gal/yr)	Adequate alternative capacity available (yes/no)	Total (million) gal/yr)
U197	0	yes	0.1	yes	0.1
U200	0	yes	0.3	yes	0.3
U201	<0.1	yes	0	yes	<0.1
U202	<0.1	yes	0	yes	<0.1
U203	0	yes	0	yes	0
U204	<0.1	yes	0	yes	<0.1
U205	0	yes	0	yes	0
U206	0	yes	0	yes	0
U207	0	yes	0	yes	0
U208	<0.1	yes	0	yes	<0.1
U209	<0.1	yes	0	yes	<0.1
U210	<0.1	yes	1.0	yes	1.0
U211	<0.1	yes	0.1	yes	0.1
U213	<0.1	yes	0	yes	<0.1
U214	<0.1	yes	0	yes	<0.1
U215	0	yes	0	yes	0
U216	0	yes	0	yes	0
U217	<0.1	yes	0	yes	<0.1
U218	<0.1	yes	0	yes	<0.1
U219	<0.1	yes	<0.1	yes	<0.1
U220	0.1	yes	<0.1	yes	0.2
U222	0	yes	0	yes	0
U225	<0.1	yes	0	yes	<0.1
U226	<0.1	yes	0.1	yes	0.1
U227	2.7	yes	2.7	yes	5.3
U228	<0.1	yes	<0.1	yes	<0.1
U234	<0.1	yes	0	yes	<0.1
U236	0	yes	0	yes	0
U237	<0.1	yes	0	yes	<0.1
U238	<0.1	yes	0	yes	<0.1
U239	0.2	yes	0.2	yes	0.4
U240	<0.1	yes	0	yes	<0.1
U243	0	yes	0	yes	0
U244	<0.1	yes	<0.1	yes	<0.1
U246	0	yes	0	yes	0
U247	<0.1	yes	0	yes	<0.1
U248	<0.1	yes	0	yes	<0.1
U249	<0.1	yes	0	yes	<0.1

a - D001 ignitables
b - D001 reactive, oxidizers
c - D002 acids and alkalines
d - D002 other corrosives
e - D003 cyanides
f - D003 sulfides
g - D003 explosives, reactives
h - D006 cadmium
i - D006 nickel cadmium batteries
j - D008 lead nonbatteries
k - D008 lead acid batteries
l - F006 cyanides and metals
m - F006 treated cyanides and metals
n - F006 chrome
o - F039 multi-source leachate
p - K106 high concentration mercury
q - K106 low concentration mercury
r - U151 high concentration mercury
s - u151 low concentration mercury

Note: Although data indicates that K101, K102, P036, P038, P065, U136, U151 surface disposed wastes are not currently being land disposed, these waste codes are being generated. Because no capacity exist for these wastes under their appropriate BDAT, EPA is granting a variance to those codes.

1. INTRODUCTION

This section contains a brief summary of the legal background on the Land Disposal Restriction Program, a summary of the results of capacity analyses to support prior restrictions, and an introduction to the capacity analysis for those wastes analyzed for this final Third Third rule.

Section 2 contains the detailed results of the capacity analysis for the Third Third final rule. Section 3 includes a capacity analysis for each waste code. Section 4 details the Agency's capacity analysis methodology. Section 5 lists the references used to prepare this document.

1.1 Legal Background

1.1.1 General Requirements Under HSWA

The Hazardous and Solid Waste Amendments of 1984 (HSWA), enacted on November 8, 1984, amended the Resource Conservation and Recovery Act (RCRA) of 1976 in several significant ways. Among other initiatives, the amendments require the Environmental Protection Agency (EPA) to promulgate regulations restricting the land disposal of hazardous wastes according to a strict, detailed schedule. This effort is generally referred to as the Land Disposal Restriction Program.

1.1.2 Schedule for Developing Restrictions

HSWA set a strict schedule for establishing treatment standards, based generally on priorities related to the volume and intrinsic hazards of different types of wastes. Two groups received early attention: (1) solvent and dioxin wastes, to be regulated within 24 months of HSWA's passage, and (2) the so-called "California list" wastes, to be regulated within 32 months. The solvent/dioxin waste group identified in HSWA includes those solvent wastes covered under waste codes F001, F002, F003, F004, and F005, as well as the dioxin-containing wastes covered under waste codes F020, F021, F022, and F023 (RCRA section 3004(e)). The final dioxin regulation also established treatment standards for F026, F027, and F028.

The California list wastes, a group of wastes originally listed by the State of California and adopted intact within HSWA, include liquid hazardous wastes containing metals, free cyanides, PCBs, acidic corrosives (pH of less than or equal to 2.0), and any liquid or nonliquid hazardous waste containing halogenated organic compounds (HOCs) above 0.1 percent (1,000 ppm) by weight.

Priorities for all other hazardous wastes listed under RCRA section 3001 were established separately, based on considerations of volume and intrinsic hazard, in a formal schedule submitted to Congress on November 8, 1986 (RCRA section 3004(g)(1)). This schedule requires all final land disposal restrictions to be in place by May 8, 1990. Consistent with the requirements of HSWA, EPA divided all other listed hazardous wastes into three groups (the "Thirds"), to be regulated in successive stages over a period of 66 months from the passage of HSWA on November 8, 1984.

The overall schedule for the Land Disposal Restriction Program is as follows:

- Solvents and dioxins: Final standards promulgated on November 7, 1986.
- California list wastes: Final standards promulgated on July 8, 1987.
- "First Third" scheduled wastes: Final standards promulgated on August 8, 1988.
- "Second Third" scheduled wastes: Final standards promulgated on June 8, 1989.
- "Third Third" scheduled wastes: Final standards promulgated on May 8, 1990.

1.1.3 Variance from the Schedule

The land disposal restrictions are effective when promulgated unless the Administrator grants a national capacity variance and establishes a different date, not to exceed two years beyond the statutory deadline, based on "the earliest date on which adequate alternative treatment or recovery capacity which protects human health and the environment will be available" (RCRA section 3004(h)(2)). In addition, case-by-case extensions can be granted by EPA for up to one year (renewable once) from a ban effective date if applicants demonstrate alternative capacity is not available, and that they have entered into a binding contract to construct or otherwise provide alternative capacity.

1.2 Summary of Previous Land Disposal Restrictions

Capacity analyses to support previous land disposal restrictions were performed using the best data available at the time to develop national estimates of both the amount of waste land disposed and the available alternative commercial treatment and recovery capacity. Analyses of affected wastes considered the combination of waste code, physical/chemical form, and type of restricted management practice to determine the amount of alternative capacity required.

1.2.1 Solvents and Dioxins

The Land Disposal Restrictions Program began with the promulgation of the solvents and dioxins rule on November 7, 1986 (51 FR 40572). The final rule included spent solvent wastes (F001-F005) and dioxin-containing wastes (F020-F023 and F026-F028), and established treatment standards expressed as concentrations in the waste extract. The rule prohibits land disposal of solvent and dioxin wastes unless the wastes contain less than the specified concentrations of hazardous constituents.

Initially, EPA used the 1981 Regulatory Impact Analysis (RIA) Mail Survey[1] to identify the volume of land disposed solvent wastes subject to the restrictions. Although EPA did not establish required treatment technologies for these wastes, EPA used the physical and chemical characteristics that were reported for each waste stream to identify the technology or technologies that EPA assumed would be used to meet the treatment standards. The waste volumes were distributed among the applicable technologies as shown below:

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[1] USEPA. 1984. U.S. Environmental Protection Agency. National Survey of Hazardous Waste Generators and Treatment, Storage, and Disposal Facilities Regulated Under RCRA in 1981. EPA/530-SW-005, GPO Pub. #5/N055-000-00239-8.

Waste stream	Applicable treatment and recovery technologies
Solvent-water mixtures	Wastewater treatment
Organic liquids	Distillation Fuel substitution Incineration
Organic sludges	Fuel substitution Incineration
Inorganic sludges or solids	Incineration

After identifying the required alternative capacity for solvent wastes, EPA analyzed the available commercial capacity for these technologies.

Analysis of available commercial capacity (supply) and required capacity (demand) showed shortfalls in available capacity for wastewater treatment and incineration. Consequently, EPA granted a two-year national capacity variance to CERCLA and RCRA corrective action wastes; small quantity generator (SQG) wastes; and all wastes containing less than 1 percent total F001-F005 solvent constituents, i.e., solvent-water mixtures, solvent-containing sludges, and solvent-contaminated soil (40 CFR 268.30 and the Background document for solvents final rule).[2]

EPA determined the volume of dioxin-containing waste generated annually and affected by the restrictions. Incineration capacity for these dioxin wastes was determined to be inadequate; therefore, a two-year national capacity variance was granted (51 FR 40617).

The final rule for the First Third Wastes, published on August 17, 1988 (53 FR 31138), included a reanalysis of available and required treatment capacity for solvent wastes using data from EPA's new data set based on the results of EPA's National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities (the TSDR Survey). The results of this reanalysis demonstrated that adequate capacity exists for solvent wastes. EPA therefore allowed the capacity variances to expire on November 8, 1988.

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[2] USEPA. 1986. U.S. Environmental Protection Agency, Office of Solid Waste. Background Document for Solvents to Support 40 CFR Part 268, Land Disposal Restrictions, Final Rule. EPA Contract No. 68-01-7053. Washington, D.C.: U.S. Environmental Protection Agency.

1.2.2 California List

Unlike the solvents and dioxins rule, the California list rule is not waste code specific. The California list includes all liquid hazardous waste with a pH of less than or equal to 2.0 (i.e., acidic corrosive waste); all liquid hazardous wastes containing free cyanide, metals, or polychlorinated biphenyls (PCBs) in concentrations greater than or equal to those specified in 40 CFR 268.32; and all hazardous wastes (liquid or nonliquid) containing halogenated organic compounds (HOCs) in amounts greater than or equal to the levels specified in 40 CFR 268.32.

The California list final rule was promulgated on July 8, 1987 (52 FR 25760). This rule required the use of specific technologies rather than the establishment of performance-based standards for California list PCB wastes and certain California list HOC wastes. Specifically, the rule requires incineration in accordance with 40 CFR Part 264, Subpart O, or Part 265, Subpart O, for HOC wastes (except HOC wastewaters) and thermal treatment in accordance with 40 CFR 761.60 or 761.70 for PCB wastes. EPA codified the statutory prohibition level (RCRA section 3004(d)(2)) for acidic corrosive wastes (those with a pH of ≤ 2.0), but did not promulgate a treatment standard for these wastes. The final rule did not establish prohibition levels for metal or cyanide wastes; therefore, upon promulgation, the RCRA section 3004(d)(2) statutory levels became effective.

EPA originally used data from the 1981 RIA Mail Survey[3] to determine the maximum potential volume of land disposed waste subject to the California list restrictions. To determine the required alternative treatment capacity for these waste volumes, EPA identified those technologies that it believed would generally be used to treat California list wastes. EPA then determined the commercially available alternative treatment capacity for these wastes.

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[3] USEPA. 1984. U.S. Environmental Protection Agency. National Survey of Hazardous Waste Generators and Treatment, Storage, and Disposal Facilities Regulated Under RCRA in 1981. EPA/530-SW-005, GPO Pub. #5/N055-000-00239.8.

A comparison of required and available treatment capacity for the California list wastes for which a BDAT has been established showed that incineration capacity for HOC wastes was inadequate. Consequently, EPA granted a two-year national capacity variance to HOC wastes requiring incineration. On the other hand, EPA determined that adequate capacity for PCB wastes did exist and thus did not grant a variance for these wastes. EPA believes that acidic corrosive, cyanide, and metal wastes can be treated to below the California list statutory levels by tank treatment methods including neutralization, cyanide oxidation, chromium reduction, and chemical precipitation. Furthermore, since the rule applies only to liquid wastes, they may still be land disposed after being rendered non-liquid. Consequently, EPA believed that adequate capacity for these wastes exists and did not grant a capacity variance for them.[4]

The final rule for the First Third wastes, however, included a reanalysis of required and available treatment capacity for California list HOC wastes based on the TSDR Survey data. The results indicated significant changes in waste management practices and capacity, specifically, substantial increases in commercial incineration capacity. As a result, EPA determined that capacity variances were no longer needed for HOC wastes, except for HOC-contaminated soils, and therefore rescinded the California list HOC variance effective November 8, 1988.

1.2.3 First Third Wastes

On August 17, 1988, the Agency published the final rule for the First Third wastes. This final rule promulgated treatment standards for some of the First Third wastes. The remaining First Third wastes for which treatment standards were not established were covered by the soft hammer requirements.

EPA used the TSDR Survey data set to determine affected waste volumes requiring alternative capacity and available commercial treatment/recovery capacity. Required alternative capacity was then compared with available commercial treatment/recovery capacity. This comparison showed adequate capacity for all First Third wastes except petroleum refining wastes (K048, K049, K050, K051, and K052) for which BDAT is sludge incineration or solvent extraction; high zinc (greater than or equal to 15 percent zinc) electric arc furnace dust (K061) for which BDAT is high temperature metals recovery; and mercury cell chlorine production waste (K071) for which BDAT is acid leaching. Consequently, EPA granted a two-year national capacity variance to K048-K052 and K071 wastes. EPA also granted a two-year national variance from the high temperature metals recovery-based standards to high zinc K061 wastes, but in the interim required these wastes to meet the standard for low zinc K061 based on stabilization.[5]

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[4] USEPA. 1987. U.S. Environmental Protection Agency, Office of Solid Waste. Background Document for California List Wastes to Support 40 CFR Part 268 Land Disposal Restrictions. Final Rule. EPA Contract No. 68-01-7053. Washington, D.C.: U.S. Environmental Protection Agency.

1.2.4 Underground Injected Wastes

EPA has promulgated three final rules restricting the underground injection of certain wastes. The first of these rules, published on July 26, 1988 (53 FR 28118), restricted solvent and dioxin wastes. For this final rule, EPA used the results of the TSDR Survey to perform an analysis of required and available treatment/recovery capacity. The results of the analysis showed inadequate capacity for the volume of underground injected solvent wastes containing less than 1 percent total F001-F005 solvent constituents for which the BDAT standard is based on wastewater treatment (steam stripping, biological treatment, wet-air oxidation, or carbon adsorption). Consequently, EPA granted a two-year national capacity variance from the treatment standard until August 8, 1990, to underground injected solvent wastes containing less than 1 percent total F001-F005 solvent constituents that are disposed of by injection in Class I wells.

Conversely, the analysis also showed that adequate capacity did exist for the volume of solvent wastes containing greater than or equal to 1 percent total F001-F005 solvent constituents for which the BDAT standard is based on incineration. Consequently, these wastes were restricted from underground injection on August 8, 1988. Furthermore, available data showed that no dioxin wastes are being injected, and thus the Agency did not grant a variance from the August 8, 1988, effective date for restricting the underground injection of these wastes.

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[5] USEPA. 1988. U.S. Environmental Protection Agency, Office of Solid Waste. Background Document for First Third Wastes to Support 40 CFR Part 268 Land Disposal Restrictions. Final Rule. EPA Contract No. 68-01-7053. Washington, D.C.: U.S. Environmental Protection Agency.

The second final rule (53 FR 30908) restricted the underground injection of California list wastes and certain First Third wastes, specifically K062, K049-K052, K071, and K104. For this rule, the Agency used data from the Hazardous Waste Injection Well Data Base (HWIWDB) and the TSDR Survey to perform a capacity analysis for these wastes. This analysis showed inadequate capacity for all underground injected California list wastes except for those containing greater than 50 ppm polychlorinated biphenyls (PCB) requiring thermal treatment and wastes containing HOCs greater than 1,000 ppm requiring incineration or reuse as fuel. Furthermore, the analysis identified insufficient capacity for all the First Third wastes subject to the rulemaking (K062, K049-K052, K071, and K104). EPA granted a two-year national capacity variance to underground injected California list wastes (except PCB wastes greater than 50 ppm and HOC wastes greater than 1,000 ppm) and K049-K052, K062, K071, and K104 wastes.

EPA published its approach for the remainder of the underground injected First Third wastes on June 14, 1989 (54 FR 25416).

EPA established effective dates for those underground injected First Third wastes for which BDAT has been established but were not addressed in the August 16, 1988, final rule for underground injection wastes discussed previously. EPA determined that sufficient capacity exists for K019 and K030 wastes for which BDAT is biological degradation, and for concentrated K016 wastes (≥ 1 percent) and K103 wastes for which BDAT is liquid incineration. However, for dilute K016 (<1 percent) wastes for which BDAT is biological treatment followed by wet-air oxidation, EPA determined that sufficient capacity does not exist. Consequently, for K019, K030, K103, and concentrated K016 (≥ 1 percent) underground injected wastes, EPA did not grant a national capacity variance. For dilute K016 (<1 percent) underground injected wastes, however, EPA did grant a national capacity variance until August 8, 1990.

1.2.5 Second Third Wastes

On June 23, 1989, EPA finalized treatment standards for some of the Second Third wastes, for some of the First Third wastes previously subject to the soft hammer provisions, and also for some of the wastes that were originally Third Third wastes.

For the Second Third final rule (54 FR 26594), EPA used the TSDR Survey to estimate the volume of affected wastes requiring alternative capacity and the amount of available commercial capacity. The results of this analysis showed that adequate commercial capacity does exist for all Second Third wastes currently surface disposed (i.e., treatment or storage in waste piles; treatment, storage, or disposal in surface impoundments; and disposal by land treatment and in landfills). However, in order to allow time for facilities to adjust existing cyanide treatment processes to operate more efficiently, EPA decided to grant a 30-day extension for F006 nonwastewaters and for F007, F008, F009, F011, and F012 wastes (both wastewaters and nonwastewaters).

In addition, because F011 and F012 heat treating wastes are often commingled with F006, F007, F008, and F009 electroplating wastes, EPA expects that they will have to be segregated and treated separately. To allow some time to adjust processes to segregate these heat treating (F011, F012) and electroplating wastes (F006, F007, F008, and F009), EPA deferred the total and amenable cyanide standards for F011 and F012 heat treating wastes until December 8, 1989. However, between July 8, 1989, and December 8, 1989, these wastes will be subject to the same cyanide standards as the electroplating wastes (F006, F007, F008, and F009).

The analysis also showed that inadequate commercial capacity existed for the volume of underground injected wastes requiring liquid incineration or reuse as fuel, cyanide destruction, and wastewater treatment for organics. Consequently, EPA granted a two-year national capacity variance to underground injected K011, K013, and K014 nonwastewaters, for which BDAT is incineration; to underground injected K009 wastewaters, for which BDAT is steam stripping and/or biological treatment; and to underground injected F007 wastes, for which BDAT is cyanide destruction.[6]

In addition, as previously mentioned, EPA granted a thirty day variance from the cyanide standards to F006 nonwastewaters and F007, F008, and F009 wastewaters and nonwastewaters. EPA deferred the cyanide standards for F011 and F012 until December 8, 1989. However, between July 8, 1989, and December 8, 1989, F011 and F012 wastes will be subject to the same cyanide standards as the electroplating wastes (F006, F007, F008, and F009).

1.3 Introduction to the Third Third Final Rule

Today the Agency is promulgating treatment standards for a major part of the Third Third wastes as well as for First Third wastes and Second Third wastes which were previously under soft hammer restrictions. These wastes include contaminated soils and some California list HOCs. In addition to the three Thirds, this final rule also accounts for multi-source leachate and mixed radioactive wastes. These wastes, hereafter referred to as Third Third promulgated wastes are listed in Table 1-1 along with their designation of the Third group in which each individual waste was originally scheduled.

1.3.1 Surface-Disposed Wastes

In the case of non-soil wastes, the analysis determined that available capacity is less than required capacity for some surface-disposed wastes and underground injected wastes. Five treatment technologies fail to meet the capacity requirements of surface disposed non-soil wastes: acid leaching followed by chemical precipitation; combustion of sludge/solids; mercury retorting; thermal recovery; and vitrification. Consequently, EPA is granting a national capacity variance for the following surface-disposed wastes: D009, K106, P065, P092, and U151 low mercury nonwastewaters; F039 multi-source leachate nonwastewaters and K048, K049, K050, K051, and K052 nonwastewaters; D009, K106, P065, P092, and U151 high mercury nonwastewaters; D008 lead acid batteries in storage areas prior to secondary smelting; P087 wastewaters and nonwastewaters; and D004, K031, K084, K101, K102, P010, P011, P012, P036, P038, and U136 nonwastewaters. EPA is granting these wastes a two-year national capacity variance, except for K048, K049, K050, K051, and K052 petroleum-refining nonwastewaters. EPA is granting K048-K052 petroleum-refining nonwastewaters a six-month national capacity variance.

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[6] USEPA. 1988. U.S. Environmental Protection Agency, Office of Solid Waste. Background Document for Second Third Wastes to Support 40 CFR Part 268 Land Disposal Restrictions. Proposed Rule. EPA Contract No. 68-01-7053. Washington, D.C.: U.S. Environmental Protection Agency.

1.3.2 Deepwell-Disposed Wastes

Nine commercial technologies also have less than the required capacities for underground injected wastes. EPA is granting a two-year national capacity variance for the following wastes: D003 cyanide wastewaters and nonwastewaters; D003 sulfide wastewaters and nonwastewaters; D003 explosive/reactive wastewaters and nonwastewaters; D007 wastewaters and nonwastewaters; D009 nonwastewaters; D002 wastewaters and nonwastewaters; K011 and K013 wastewaters and K014 wastewaters and nonwastewaters; and F039 multi-source leachate wastewaters.

1.3.3 Soil and Debris

In the case of contaminated soils, the capacities of four treatment technologies did not meet the capacity needs of the waste volumes requiring treatment. EPA is promulgating today an extension of the effective date for certain First, Second, and Third Third contaminated soil and debris for which the treatment standards promulgated today are based on incineration, inorganic solids debris treatment, mercury retorting, or vitrification.

1.3.4 Mixed Radioactive Wastes

In the analysis of mixed radioactive wastes, EPA determined that there is currently a treatment capacity shortfall for all mixed radioactive wastes that are surface-disposed. Consequently, EPA is granting a two-year national capacity variance for all surface-disposed mixed radioactive wastes. EPA has no information on the deepwell-disposal of mixed radioactive wastes and, therefore, is not granting a national capacity variance for these wastes.

Table 1-1
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third
D001	Ignitable Wastes	3
D002	Corrosive Wastes	3
D003	Reactive Wastes	3
D004	Arsenic	3
D005	Barium	3
D006	Cadmium	3
D007	Chromium	3
D008	Lead	3
D009	Mercury	3
D010	Selenium	3
D011	Silver	3
D012	Endrin	3
D013	Lindane	3
D014	Methoxyclor	3
D015	Toxaphene	3
D016	2,4-D	3
D017	2,4,5-TP Silvex	3
F002[a]	Spent halogenated solvents	Solvents/Dioxins
F005[a]	Spent non-halogenated solvents	Solvents/Dioxins
F006[b]	Electroplating Wastes	1
F019	Aluminum coating wastes	1
F024[c]	Chlorinated aliphatic hydrocarbon production wastes	2

Table 1-1 (continued)
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third
F025	Condensed light ends, spent filters and filter aids, and spent dessicant wastes from the production of certain chlorinated aliphatics.	3
F039	Multi-source leachate.	3
K002	Chrome yellow and orange pigment production wastes.	3
K003	Molybdate orange pigment production wastes.	3
K004[d]	Wastewater treatment sludge from the production of zinc yellow pigments.	1
K005[e]	Wastewater treatment sludge from the production of chrome green pigments.	2
K006	Chrome oxide green production wastes.	3
K007[e]	Wastewater treatment sludge from the production of iron blue pigments.	2
K008[d]	Oven residue from the production of chrome oxide green pigments.	1
K011[b]	Bottom stream from wastewater stripper in the production of acrylonitrile.	1
K013[b]	Bottom stream from acetonitrile column in the production of acrylonitrile.	1
K014[b]	Bottoms from acetonitrile purification column in the production of acrylonitrile.	1
K015	Still bottoms from the production of benzyl chloride.	1
K017	Heavy ends (still bottoms) from the purification column in the production of epichlorohydrin.	1
K021[d]	Aqueous spent antimony catalyst waste from fluoromethanes production.	1
K022[b]	Distillation bottom tars from the production of phenol/acetone from cumene.	1

Table 1-1 (continued)
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third
K025[d]	Distillation bottoms from the production of nitrobenzene by the nitration of benzene.	2
K026	Methyl ethyl pyridines production wastes.	3
K029[b]	Waste from the product steam stripper in the production of 1,1,1-trichloroethane.	2
K031	By-product salts generated in the production of MSMA and cacodylic acid.	1
K032-K034	Chlordane production wastes.	3
K035	Wastewater treatment sludges generated in the production of creosote.	1
K036[f]	Still bottoms from toluene reclamation distillation in the production of disulfoton.	1
K037[g]	Wastewater treatment sludge from the production of disulfoton.	1
K041	Wastewater treatment sludge from the production of toxaphene.	2
K042	Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T.	2
K044[h]	Wastwater treatment sludges from the manufacturing and processing of explosives.	1
K045[h]	Spent carbon from the treatment of wastewater containing explosives.	1
K046[i]	Wastewater treatment sludges from the manufacturing formulation, and loading of lead-based initiating compounds.	1
K047[h]	Pink/red water from TNT operations.	1
K048[j]	Dissolved air flotation (DAF) float from the petroleum refining industry.	1
K049[j]	Slop oil emulsion solids from the petroleum refining industry.	1

Table 1-1 (continued)
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third
K050[j]	Heat exchanger bundle cleaning sludge from the petroleum refining industry.	1
K051[j]	API separator sludge from the petroleum refining industry.	1
K052[j]	Tank bottoms (leaded) from the petroleum refining industry.	1
K060[b]	Ammonia still lime sludge from coking operations.	1
K061[b]	Emission control dust/sludge from the primary production of steel in electric furnaces.	1
K069[k]	Emission control dust/sludge from secondary lead smelting.	1
K071[f]	Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used.	1
K073	Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production.	1
K083[k]	Distillation bottoms from aniline production.	1
K084	Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	1
K085	Distillation or fractionation column bottoms from the production of chlorobenzenes.	1
K086[l]	Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from the cleaning of tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead.	1
K095[b]	Distillation bottoms from the production of 1,1,1-trichloroethane.	2
K096[b]	Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane.	2

Table 1-1 (continued)
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third
K097	Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane.	2
K098	Untreated process wastwater from the production of toxaphene.	2
K100[*]	Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting.	3
K101[m]	Distillation tar residues from the distillation of anilene-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	1
K102[m]	Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	1
K105	Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes.	2
K106	Wastewater treatment sludge from the mercury cell process in chlorine production.	1
P001	Warfarin, when present at concentration > 0.3%	1
P002	1-Acetyl-2-thiourea	2
P003	Acrolein	2
P004	Aldrin	1
P005	Allyl alcohol	1
P006	Aluminum phosphide	3
P007	5-(Aminoethyl)-3-isoxazolol	2
P008	4-Aminopyridine	2
P009	Ammonium picrate	3
P010	Arsenic acid	1
P011	Arsenic (V) oxide	1

Table 1-1 (continued)
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third
P012	Arsenic (III) oxide	1
P013[n]	Barium cyanide	3
P014	Benzenethiol (Thiophenol)	2
P015	Beryllium dust	1
P016	Bis(chloromethyl) ether	1
P017	Bromoacetone	3
P018	Brucine	1
P020	Dinoseb	1
P022	Carbon disulfide	3
P023	Chloro-acetaldehyde	3
P024	p-Chloroaniline	3
P026	1-(o-Chlorophenyl)thiourea	2
P027	3-chloropropionitrile	2
P028	Benzyl chloride	3
P031	Cyanogen	3
P033	Cyanogen chloride	3
P034	4,6-Dinitro-2-cyclohexylphenol	3
P036	Dichlorophenylarsine	1
P037	Dieldrin	1
P038	Diethylarsine	3
P042	Epinephrine	3
P045	Thiofanox	3
P046	Alpha, alpha-Dimethylphenethylamine	3
P047	4,6-Dinitro-o-cresol and salts	3

Table 1-1 (continued)
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third
P048	2,4-Dinitrophenol	1
P049	2,4-Dithiobiuret	2
P050	Endosulfan	1
P051	Endrin	3
P054	Aziridine	2
P056	Fluorine	3
P057	Flouracetamide	2
P058	Flouracetic acid, sodium salt	1
P059	Heptachlor	1
P060	Isodrin	2
P064	Isocyanic acid, methyl ester	3
P065	Mercury fulminate	3
P066	Methomyl	2
P067	2-Methylaziridine	2
P068	Methyl Hydrazine	1
P069	Methyllactonitrile	1
P070	Aldicarb	1
P072	Alpha-Naphthylthiourea (ANTU)	2
P073	Nickel Carbonyl	3
P075	Nicotine and salts	3
P076	Nitric oxide	3
P077	P-Nitroaniline	3
P078	Nitrogen dioxide	3
P081	Nitroglycerine	1

Table 1-1 (continued)
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third
P082	N-Nitrosodimethylamine	1
P084	N-Nitrosomethylvinylamine	1
P087	Osmium tetraoxide	1
P088	Endothall	3
P092	Phenylmercuric acetate	1
P093	N-Phenylthiourea	3
P095	Phosgene	3
P096	Phosphine	3
P099[a]	Potassium silver cyanide	2
P101	Propanenitrile	3
P102	Propargyl alcohol	1
P103	Selenourea	3
P104[a]	Silver cyanide	2
P105	Sodium azide	1
P107	Strontium sulfide	2
P108	Strychnine and salts	1
P110	Tetraethyl lead	1
P112	Tetranitromethane	2
P113	Thallic oxide	2
P114	Thallium (I) selenite	2
P115	Thallium (I) sulfate	1
P116	Thiosemicarbazide	3
P118	Trichloromethanethiol	3
P119	Ammonium vanadate	3

Table 1-1 (continued)
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third
P120	Vanadium pentoxide	1
P122	Zinc phosphide, when present at concentrations > 10%	1
P123	Toxaphene	1
U001	Acetaldehyde	3
U002	Acetone	2
U003	Acetonitrile	2
U004	Acetophenone	3
U005	2-Acetylaminofluorene	2
U006	Acetyl chloride	3
U007	Acrylamide	1
U008	Acrylic acid	2
U009	Acrylonitrile	1
U010	Mitomycin C	1
U011	Amitrole	2
U012	Aniline	1
U014	Auramine	2
U015	Azaserine	2
U016	Benz(c)acridine	1
U017	Benzal chloride	3
U018	Benz(a)anthracene	1
U019	Benzene	1
U020	Benzenesulfonyl chloride	2
U021	Benzidine	2

Table 1-1 (continued)
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third
U022	Benzo(a)pyrene	1
U023	Benzotrichloride	2
U024	Bis(2-chloroethoxy)methane	3
U025	Dichloroethyl ether	2
U026	Chlornaphazine	2
U027	Bis(2-chloroisopropyl)ether	3
U029	Methyl bromide	1
U030	Benzene, 1-bromo-4-phenoxy	3
U031	n-Butanol	1
U032	Calcium chromate	2
U033	Carbonyl fluoride	3
U034	Chloral	3
U035	Chlorambucil	2
U036	Chlordane, technical	1
U037	Chlorobenzene	1
U038	Ethyl-4-4-dichlorobenzilate	3
U039	4-Chloro-m-cresol	3
U041	n-Chloro-2,3-epoxypropane	1
U042	Vinyl ether 2-chloroethyl	3
U043	Vinyl chloride	1
U044	Chloroform	1
U045	Methyl chloride	3
U046	Chloromethyl methyl ether	1
U047	Beta-chloronaphthalene	2

Table 1-1 (continued)
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third
U048	o-chlorophenol	3
U049	4-Chloro-o-toluidine, hydrochloride	2
U050	Chrysene	1
U051	Creosote	1
U052	Cresols	3
U053	Crotonaldehyde	1
U055	Cumene	3
U056	Cyclohexane	3
U057	Cyclohexanone	2
U059	Daunomycin	2
U060	DDD	2
U061	DDT	1
U062	Diallate	2
U063	Dibenz (a.h) anthracene	1
U064	1,2,7,8-Dibenzopyrene	1
U066	1,2-Dibromo-3-chloropropane	1
U067	Ethylene, dibromide	1
U068	Methane, dibromo	3
U070	o-Dichlorobenzene	2
U071	M-Dichlorobenzene	3
U072	P-Dichlorobenzene	3
U073	Dichlorobenzidene, 3,3-	2
U074	1,4-Dichloro-2-butene	1
U075	Dichlorodifluoromethane	3

Table 1-1 (continued)
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third
U076	Ethane, 1,1-dichloro	3
U077	Ethane, 1,2-dichloro-	1
U078	Dichloroethylene, 1,1-	1
U079	1,2-Dichloroethylene	3
U080	Methylene chloride	2
U081	2,4-Dichlorophenol	3
U082	2,6-Dichlorophenol	3
U083	Dichloropropane, 1,2-	2
U084	1,3-Dichloropropene	3
U085	2,2-Bioxirane	3
U086	N,N-Diethylhydrazine	1
U089	Diethylstilbestrol	1
U090	Dihydrosafrole	3
U091	3,3-Dimethoxybenzidine	3
U092	Dimethylamine	2
U093	Dimethylaminoazobenzene	2
U094	Dimethylbenz(a)anthracene,7,12-	2
U095	Dimethylbenzidine,3,3-	2
U096	Alpha,alpha-Dimethylbenzylhydroxyperoxide	3
U097	Dimethylcarbamoyl chloride	2
U098	Dimethylhydrazine, 1,1-	2
U099	Dimethylhydrazine, 1,2-	2
U101	Dimethylphenol, 2,4-	2
U103	Dimethyl sulfate	1

Table 1-1 (continued)
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third
U105	2,4-Dinitrotoluene	1
U106	Dinitrotoluene, 2,6-	2
U108	Dioxane, 1,4-	1
U109	1,2,-Diphenylhydrazine	2
U110	Dipropylamine	2
U111	Di-N-Propylnitrosamine	2
U112	Ethyl acetate	3
U113	Ethyl acrylate	3
U114	Ethylenebis-(dithiocarbamic acid salts and esters)	2
U115	Ethylene oxide	1
U116	Ethylene thiourea	2
U117	Ethyl ether	3
U118	Ethyl methacrylate	3
U119	Ethyl methanesulfonate	2
U120	Fluoranthene	3
U121	Trichloromonofluoromethane	3
U122	Formaldehyde	1
U123	Formic acid	3
U124	Furan	1
U125	Furfural	3
U126	Glycidylaldehyde	3
U127	Hexachlorobenzene	2
U128	Hexachlorobutadiene	2

Table 1-1 (continued)
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third
U129	Lindane	1
U130	Hexachlorocyclopentadiene	1
U131	Hexachloroethane	2
U132	Hexachlorophene	3
U133	Hydrazine	1
U134	Hydrofluoric acid	1
U135	Hydrogen sulfide	2
U136	Cacodylic acid	3
U137	Indeno (1,2,3-cd)pyrene	1
U138	Methyl iodide	2
U139	Iron dextran	3
U140	Isobutyl alcohol	2
U141	Isosafrole	3
U142	Kepone	2
U143	Lasiocarpine	2
U144	Lead acetate	2
U145	Lead phosphate	3
U146	Lead subacetate	2
U147	Maleic anhydride	2
U148	Maleic hydrazide	3
U149	Malononitrile	2
U150	Melphalan	2
U151	Mercury	1
U152	Methacrylonitrile	3

Table 1-1 (continued)
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third
U153	Methanethiol	3
U154	Methanol	1
U155	Methapyrilene	1
U156	Methyl chlorocarbonate	3
U157	3-Methylcholanthrene	1
U158	4,4-Methylenebis-(2-chloroaniline)	1
U159	Methyl ethyl ketone	1
U160	Methyl ethyl ketone peroxide	3
U161	Methyl isobutyl ketone	2
U162	Methyl methacrylate	2
U163	N-Methyl-N-nitro-N-nitrosoguanidine	2
U164	Methylthiouracil	2
U165	Naphthalene	2
U166	1,4-Naphthaquinone	3
U167	1,naphthylamine	3
U168	Napthylamine, 2-	2
U169	Nitrobenzene	2
U170	p-Nitrophenol	2
U171	Nitropropane, 2-	2
U172	N-Nitroso-di-n-butylamine	2
U173	N-Nitroso-diethanolamine	2
U174	N-Nitroso-diethylamine	2
U176	N-Nitroso-N-ethylurea	2
U177	N-Nitroso-N-methylurea	1

Table 1-1 (continued)
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third
U178	N-Nitroso-N-methylurethane	2
U179	N-Nitrosopiperidine	2
U180	N-Nitrosopyrrolidine	1
U181	5-Nitro-o-toluidine	3
U182	Paraldehyde	3
U183	Pentachlorobenzene	3
U184	Pentachloroethane	3
U185	Pentachloronitrobenzene	1
U186	1,3-Pentadiene	3
U187	Phenacetin	3
U188	Phenol	1
U189	Phosphorus sulfide	2
U191	2-Picoline	3
U192	Pronamide	1
U193	1,3-Propane sultone	2
U194	1-Propanamine	3
U196	Pyridine	2
U197	P-Benzoquinone	3
U200	Reserpine	1
U201	Resorcinol	3
U202	Saccharin and salts	3
U203	Safrole	2
U204	Selenious acid	3
U205	Selenium disulfide	2

Table 1-1 (continued)
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third
U206	Streptozotocin	2
U207	1,2,4,5-Tetrachlorobenzene	3
U208	Terchloroethane, 1,1,1,2-	2
U209	Tetrachloroethane, 1,1,2,2-	1
U210	Tetrachloroethylene	1
U211	Carbon tetrachloride	1
U213	Tetrahydrofuran	2
U214	Thallium (I) acetate	2
U215	Thallium (I) carbonate	2
U216	Thallium (I) chloride	2
U217	Thallium (I) nitrate	2
U218	Thioacetamide	2
U219	Thiourea	1
U220	Toluene	1
U222	O-Toluidine hydrochloride	3
U225	Bromotorm	3
U226	Methylchloroform	1
U227	Trichloroethane, 1,1,2-	1
U228	Trichloroethylene	1
U234	Sym-Trinitrobenzene	3
U236	Trypan blue	3
U237	Uracil mustard	1
U238	Ethyl carbamate	1
U239	Xylene	2

Table 1-1 (continued)
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third
U240	2,4-D salts and esters	3
U243	Hexachloropropene	3
U244	Thiram	2
U246	Cyanogen bromide	3
U247	Methoxychlor	3
U248	Warfarin, concentrations < 0.3 %	1
U249	Zinc phosphide, when present at concentrations of (less than or equal to) 10 %	1

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[a] BDAT standards are being promulgated for new wastewater and nonwastewater constituent; BDAT standards have been promulgated for all other wastewaters and nonwastewaters.

[b] BDAT standards are being promulgated for soft hammered wastewaters; nonwastewater BDAT standards have been promulgated.

[c] Additional BDAT standards are being promulgated for new nonwastewater constituent; BDAT standards have been promulgated for all wastewater forms.

[d] Revisions to promulgated BDAT standards for nonwastewater form are being promulgated; BDAT standards are being promulgated for soft hammered wastewater form.

[e] Revisions to promulgated BDAT standards for nonwastewater form are being promulgated; BDAT standards for wastewater form are being promulgated (not soft hammered).

[f] Revisions to promulgated BDAT standards for the nonwastewater form are being promulgated; wastewater forms have been promulgated.

[g] Revisions to promulgated BDAT standards for the wastewater form are being promulgated; BDAT standards for the nonwastewater form have been promulgated.

[h] Revisions to promulgated BDAT standards for both the wastewater and nonwastewater forms are being promulgated.

Table 1-1 (continued)
Third Third Final Rule Wastes By Waste Code

Waste Code	Description	Original Rule or Third

[i] BDAT standards have been promulgated for the nonwastewater subcategory; BDAT standards for the remaining soft hammered nonwastewaters subcategory and the soft hammered wastewaters are being promulgated.

[j] Revisions to promulgated BDAT concentration standards for nonwastewaters are being promulgated; additional BDAT standards are being promulgated for the wastewaters because of new constituent restrictions.

[k] Revisions to promulgated BDAT standards for a nonwastewater subcategory are being promulgated; standards are being promulgated for the remaining soft hammered nonwastewater subcategory and the soft hammered wastewaters.

[l] Revisions to promulgated BDAT standards for nonwastewater and a wastewater subcategory are being promulgated; BDAT standards are being promulgated for two soft hammered subcategories for wastewaters and nonwastewaters.

[m] Revisions to promulgated concentration standards are being promulgated for wastewaters; revisions to the BDAT technology for one nonwastewater subcategory are being promulgated and BDAT standards are being promulgated for the other soft hammered nonwastewater subcategory.

[n] Additional BDAT standards are being promulgated for a new wastewater constituent; BDAT standards have been promulgated for all other wastewaters and nonwastewaters.

2. CAPACITY ANALYSES RESULTS

This section presents general discussions of the source(s) of data and the methodology used for the capacity analyses in support of the final Third Third rule. Also presented are the results of the analyses of required and available capacity conducted for this rule, as well as for previous land disposal restrictions.

2.1 General Methodology

To evaluate the adequacy of alternative treatment capacity for specific waste categories, EPA first puts restricted wastes into "treatability groups" that require similar treatment or management practices; for instance, all wastes requiring sludge incineration would be placed in the same treatability group. Where wastes present particular problems in treatment, EPA may identify "treatment trains" of multiple technologies operating in sequence. Volumes of wastes in each treatability group are adjusted to reflect the November 1988 deadline regarding minimum technology requirements for surface impoundments. The net total volume of currently land disposed hazardous waste requiring alternative treatment capacity becomes the required capacity for that treatability group. EPA then assigns the volumes of waste in each treatability group to treatment technologies or treatment trains.

Determinations of available capacity take several factors into account, some treatment processes will generate various treatment residuals, which then have to be assigned to, and accounted for within, other treatability groups. Available capacity--the difference between currently utilized capacity and the total capacity of the treatment system--must take into account the commercial status of each facility managing waste within a treatability group:

- Available treatment capacity at onsite facilities used exclusively by the waste generator cannot be considered available to other generators.
- All commercially available capacity at commercial facilities is considered fully available to any generator.

Capacity analysis begins at the facility level and aggregates upward toward the national level, assigning available excess capacity by observing the above rules. For example, available capacity at private treatment systems applies only to wastes currently land disposed at the same site. Remaining wastes are assigned to commercial capacity.

Each regulation within the Land Disposal Restriction Program accounts for the sequential and cumulative effects of all previous regulations and for projected capacity changes after 1986, as reported in the TSDR Survey. Solvents and dioxins were considered first, followed by California list wastes, First Third promulgated wastes, Second Third promulgated wastes, and Third Third promulgated wastes. Available capacity has been assigned first to all affected surface-disposed wastes, (including surface-disposed multisource leachate and residuals from their treatment), then to all underground injected wastes (including underground injected multisource leachates and residuals from their treatment), and finally to soil and debris wastes. EPA sets this priority because it believes that land disposal in surface units may represent a greater threat to human health and the environment than does underground injection. Mixed radioactive wastes are considered separately because only select facilities handle this type of waste.

2.1.1 Data Set Development

(1) National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities

(a) **Background.** To improve the quality of data used for capacity analyses of hazardous waste volumes and management practices in support of the land disposal restrictions, EPA conducted the National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities (the TSDR Survey). The TSDR Survey was designed as a census of RCRA-permitted or interim status treatment, disposal, and recycling facilities, with no weighting factors for statistical extrapolations to project national estimates. The survey also included a sample of storage-only facilities. The survey results thus provide a comprehensive source of data on waste volumes land disposed and treatment, recovery, and disposal capacity.

Receipt of the completed surveys was followed by extensive technical review and detailed analysis of the facility responses, including facility contact when necessary. Certain facility responses and data elements derived from the facility-level analysis were then incorporated into a specialized capacity data base (a series of data sets) developed on land disposal facilities and commercial treatment and recovery facilities. (See Section 4 for a detailed discussion of the capacity data base.)

(b) **Schedule and status**. The TSDR Survey was originally mailed to over 2,400 facilities in August 1987. Facilities were allowed 60 days to complete and return the surveys. Since August 1987, an additional 225 facilities that either were initially overlooked or are new have been identified and sent the TSDR Survey. Over 2,500 facilities had returned their surveys by the deadline for review and analysis of data to support this final rule.

A total of 475 facilities reported onsite land disposal/land placement (surface disposal and underground injection) of 63 billion gallons of RCRA hazardous wastes during 1986, the baseline year for the survey. All data were reviewed and have been included in the data set used to support this final rule.

A total of 236 facilities with commercial treatment/recovery technologies in 1988 have completed and returned surveys, accounting for a maximum of 11.4 billion gallons per year of commercial hazardous waste alternative capacity in 1988. Some of these facilities also reported land disposal onsite and are included among the 475 facilities noted above.

One hundred and ninety-five facilities reported having commercial processes in 1988 other than combustion, mostly wastewater treatment capacity, that may be applicable as alternative treatment/recovery of Third Third promulgated wastes, accounting for a maximum capacity of 8.7 billion gallons of commercial noncombustion treatment/recovery capacity in 1988.

Sixty facilities reported commercial combustion processes (incineration or reuse as fuel) that may be applicable for burning hazardous waste currently being land disposed, accounting for a maximum capacity of 499 million gallons of commercial liquid combustion capacity and 68 million gallons of commercial sludge and solid combustion capacity in 1988.

A total of 15 commercial treatment/recovery facilities have not returned their surveys to date. To fill known data gaps, these late facilities were contacted to gather critical capacity information; where available, other data sources were also used.

(c) **Technology capacity information.** The TSDR Survey was designed to provide comprehensive information on all current and planned hazardous waste treatment, disposal, and recycling processes at all RCRA-permitted and interim status facilities, including information on exempt processes at these facilities (e.g., recycling, wastewater treatment).[1] The baseline year for the survey was 1986. Information was requested on any planned changes to existing processes, including closures, and any new processes planned prior to 1992.

The survey included the following information on treatment and recycling processes, including those taking place in land placement units:

- General categories (including new or planned processes)
    - Type of process
    - Operating status
    - Commercial status
    - RCRA permit status (exempt, interim status, final)
- Key parameters
    - Feed rates (by physical form)
    - Operating hours
    - Pollution controls
- Waste types
    - Waste codes managed in 1986
    - Restrictions or specifications for waste managed (for commercial facilities only)
- Capacity
    - Maximum capacity (by physical form)
    - Utilization rate for 1986
    - Planned changes through 1992

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[1] Exceptions include totally enclosed treatment facilities (TETFs) and closed loop recycling (CLR), which were not required to be reported. Also, the TSDR Survey did not gather information on facilities having exempt processes only.

- Residuals
  - Quantities generated (by physical form, percent hazardous)
  - Further management
- Equipment (type of unit)
  - Tanks
  - Containers
  - Thermal treatment units
  - Land placement units (i.e., surface impoundments, waste piles)

For more details, refer to the complete set of questionnaires and instructions in the RCRA docket.[2]

(d) **Waste volumes land disposed**. The TSDR Survey was also designed to provide information on the types and quantities of all RCRA hazardous waste managed, by specific land disposal/placement practices, at all RCRA-permitted and interim status facilities. The survey provides limited but adequate characterization data (refer to Subsection 4.1.2, Treatability Analysis) to assess the treatability potential of the wastes and to identify applicable alternative treatment/recovery technologies, including:

- RCRA waste code (or codes, if more than one is applicable);
- Waste description (physical/chemical form and qualitative information on hazardous characteristics and constituents);
- Industry description (general description of the industries that generated each type of waste at a facility);
- Quantity that entered land disposal/placement in 1986; and
- Residual information (whether this waste was actually a residual from onsite hazardous waste management operations).

The TSDR Survey also provides valuable detailed information on the individual units in which land disposal/placement is occurring, including plans for closures and upgrading/retrofitting to meet the minimum technology requirements. Through review of the questionnaire responses and the facility schematics, it is possible to track individual waste streams managed in more than one type of land disposal unit or managed by more than one process (treatment, storage, or disposal) in surface impoundments and waste piles, to avoid double-counting of waste volumes. The information gathered included:

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[2] USEPA, 1987. U.S. Environmental Protection Agency, Office of Solid Waste. National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities, OMB No. 2050-0070.

- General categories
  - Type of process
  - Permit status (interim status, final)
  - Commercial status
  - Operating status
  - Closure plans
- Key parameters
  - Liner type (plans for upgrading)
  - Pollution controls
- Waste types
  - Waste types and quantities managed in 1986
  - Restrictions or specifications for waste managed (for commercial facilities only)
- Capacity
  - Design capacity
  - Utilization rate for 1986
  - Remaining capacity
  - Planned changes through 1992
- Residuals
  - Quantities of effluents and dredged solids
  - Further management

For more details, refer to the set of questionnaires contained in the RCRA docket.[3]

(e) **Overview of data handling, technical review, and quality assurance.** Extensive technical review of TSDR Survey data was required to ensure completeness, consistency, and accuracy on a per-facility basis. To achieve this goal, the review process was designed to promote the consistent and efficient identification and resolution of any errors, inconsistencies, and omissions, including any required facility follow-up. The review procedures were comprehensive and required the consideration and analysis of the facility responses to essentially every question in the survey (if applicable to that facility), as well as the review of general and detailed schematics of all onsite hazardous waste management operations. The detailed review procedures are presented in the report Technical Review Procedures for the TSDR Survey.[4]

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[3] US EPA, 1987. U.S. Environmental Protection Agency, Office of Solid Waste, National Survey of Hazardous Waste, Treatment, Storage, Disposal, and Recycling Facilities, OMB No. 2050-0070.

All surveys from TSDR facilities with onsite land disposal/placement (whether private or commercial) or commercial treatment/recovery operations were considered critical for support of the land disposal restrictions. Therefore, they were categorized as "priority" surveys and were given immediate technical review and analysis, including facility contact to resolve any major technical problems discovered in their responses. The required data entry forms were completed for either land disposal/placement and/or commercial treatment/recovery, and the survey package underwent a preliminary quality control (QC) review by the technical supervisors. As part of this preliminary QC, the supervisor then worked with the reviewer to correct or resolve any problems identified during the survey review. Every survey underwent preliminary QC review. (See Technical Review Procedures for the TSDR survey for details on the survey screening, distribution, and review procedures.)[5]

Treatability assessments of each land disposed waste stream were then conducted, as described in Subsection 4.1.2, Treatability Analysis to identify potentially applicable alternative technologies.

The last step in the review process involved a detailed, or final, QC on approximately 25 percent of the surveys. (See Quality Assurance Plan for the TSDR survey for detailed information on QC procedures.)[6] After QC, the technical review/analysis was considered to be complete.

(f) Chemical Waste Management - Emelle Alabama. The TSDR Survey originally submitted for the Chemical Waste Management facility at Emelle, Alabama (CWM-Emelle) did not contain the necessary waste stream specific data on wastes land disposed at the site to include in the capacity analysis. The facility indicated that records of 1986 were not available which could supply the detailed information.

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[4] Versar, 1988. Technical Review Procedures for the TSDR Survey. Prepared for the Office of Solid Waste. Washington, D.C.: U.S. Environmental Protection Agency.

[5] Ibid.

[6] Versar, 1988. Quality Assurance Plan for the TSDR Survey. Prepared for the Office of Solid Waste. Washington, D.C.: U.S. Environmental Protection Agency.

EPA requested additional information and CWM-Emelle responded by providing data from their 1987 Alabama Department of Environmental Management Facility Hazardous Waste Biennial Report and other statistical information on management of hazardous waste at the facility. These data were included in the TSDR Survey data base, and have been used to revise capacity analysis for the prior rules and to prepare the capacity analysis for this final rule.

These data provide information on waste streams managed at the site in 1987, not 1986 as in the TSDR Survey. It is considered, however, to be the best information available from the facility to estimate the required capacity. The data describe over 3,000 waste streams received or generated at the facility, including a brief description of the waste, the handling method, the applicable RCRA waste code(s), and the volume of the waste received or generated.

The handling method represents the disposition of the waste stream as of the end of 1987. The handling method in over 99 percent of the waste streams received and/or generated was disposed in landfills. These waste streams require alternative treatment. Other handling methods specified were for storage and thermal treatment. Because these are not land placement methods, these waste streams did not require alternative treatment.

The data for each waste stream were evaluated and a waste description code was assigned to each waste stream reported to be landfilled. The main source of information used to assign waste description codes was the description of the waste stream and the RCRA waste codes. A detailed discussion of this procedure may be found in Section 4.1. Treatability assessments of each landfilled waste stream were then conducted, as described in Subsection 4.1.2, to identify potentially applicable alternative technologies.

(2) National Survey of Hazardous Waste Generators

(a) Background. The primary purposes of the Generator Survey were (1) to gather waste characterization data on hazardous waste streams generated in the United States and (2) to gather information about exempt treatment and recovery processes at generation facilities used to manage these wastes. Late in 1987, Generator Surveys were sent to approximately 10,000 hazardous waste generator facilities. Over 300 additional facilities were sent Generator Surveys in a second mailing of surveys in early 1988. These facilities were considered representative of the hazardous waste generators in their States (based on the 1985 Biennial Report data). They included all facilities that were sent a TSDR Survey as well as the largest (non-TSDR) hazardous waste generators in each State, including the 1,000 largest generators in the U.S.

(b) Schedule and status. The Generator Survey consisted of nine questionnaires (Questionnaires GA through GI). Questionnaire GA requested general facility information and information about waste minimization practices, hydrogeology, and solid waste management units (SWMUs). Questionnaire GB requested waste characterization and minimization data for each hazardous waste stream generated at a facility, and Questionnaire GI requested information on tanks used to manage hazardous waste. The remaining questionnaires asked for information about specific exempt treatment and recovery operations. As with the TSDR Survey, historical data for calendar year 1986 activities and estimated data for planned (treatment and recovery) activities through 1992 were requested.

(c) Uses. For this final rule, data from the Generator Survey were used for two primary purposes (a report containing the Generator Survey data used to support this rule is contained in the public docket).[7] First, EPA used Generator Survey data to authenticate some larger volume wastes reported as land disposed. EPA used the Generator Survey data to compare the amount generated vs. the amount reported as being land disposed in the TSDR Survey. The Generator Survey data were also used to determine if unusual mixtures reported as being land disposed in the TSDR Survey were generated as mixtures.

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[7] Versar. 1989. Analysis of Generator Survey Data For The Third Third Wastes. Proposed rule. Prepared for the Office of Solid Waste. Washington, D.C.: U.S. Environmental Protection Agency.

(3) Multi-Source Leachate Data Sources

EPA used two primary data sources to perform the capacity analysis for multi-source leachate: The TSDR Survey and the Generator Survey. EPA analyzed data on the volumes of multi-source leachate generated and managed, including data on the facility schematics. In addition to data included in the surveys, EPA used additional data from the hazardous waste management industry submitted as part of the leachate study plan (Appendix A describes these data sources in further detail).

(4) Mixed Radioactive Waste Data Sources

Mixed radioactive waste data sources included data provided by the Department of Energy (DOE), the TSDR Survey, Generator Survey, surveys and reports for states and interstate compacts, published studies of mixed radioactive wastes, and phone contacts with government representatives and industry officials. Attachment B-1 of Appendix B describes these data sources in more detail. The DOE data provided information on mixed radioactive wastes at 21 DOE facilities. Data on each waste included annual generation rates and quantities of mixed radioactive wastes in storage. Also included is information on DOE teatment units at each facility, including treatment capacity and types of wastes handled.

The quantities of mixed radioactive wastes generated at DOE facilities were determined to constitute a large portion of all mixed radioactive wastes generated, based on an analysis of the DOE data set and the non-DOE mixed radioactive waste information. Consequently, the capacity analysis focused primarily on the data provided by DOE.

(5) Other Data Sources

Additional data sources were used when necessary to fill data gaps. One such data source was the EPA Office of Drinking Water's (ODW's) Hazardous Waste Injection Well Data Base (HWIWDB). The HWIWDB was used to estimate the volume of some underground injected wastes for which the TSDR Survey did not have data.[8] Other data were obtained from published literature (as described in Subsection 4.1.2).

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[8] Temple, Barker & Sloane, Inc. 1987. Findings on Class I hazardous wells affected by the land ban rules. Memorandum report to John Atcheson, Dave Morganvalp, and Mario Salazar, USEPA, from TBS, December 15, 1987.

For some critical elements of the capacity analysis, EPA updated the TSDR Survey data. The amount of sludge/solid combustion capacity was one such update. In the TSDR Survey, facilities were asked to provide data on planned hazardous waste treatment systems, including combustion systems. Using data obtained from EPA headquarters and regional personnel and from facility contacts, EPA determined which units were now on-line, which were experiencing delays, which were not going to be built, etc. In addition, using data obtained from facility contacts, EPA updated data on certain P and U-coded waste streams reported in the TSDR Survey as being land disposed in large volumes. EPA gathered data on the current volume, physical/chemical characteristics, generating source(s), and management of these wastes. These updated data were used to adjust the capacity analyses for these wastes.

2.1.2 Capacity Analysis Methodology

This section presents a brief description of EPA's capacity analysis methodology. A detailed explanation of the methodology is contained in Section 4.

EPA assesses capacity requirements by comparing "required" capacity with "available" capacity. The following sections briefly describe how required and available capacities were determined.

(1) Required Capacity

Required capacity, or capacity demand, consists of those volumes of wastes currently land disposed that will require alternative treatment or recovery when they are restricted from land disposal, and also includes the residuals generated by treatment of these wastes. The waste streams potentially affected by the land disposal restrictions were identified by type of land disposal, including treatment, storage, or disposal in a surface impoundment; treatment or storage in a waste pile; disposal by land treatment; and disposal in a landfill or an underground injection well. Unlike the previous land disposal restrictions in which underground injected wastes were considered under a separate rule, both surface disposed and underground injected wastes are included in the Second Third and Third Third Final rules.

Salt dome formations, salt bed formations, and underground mines and caves are additional methods of land disposal that are affected by this rulemaking. Since insufficient information is available to document the volume of wastes disposed of by these three methods, they are not addressed in the analysis of volumes and required alternative capacity.

The volumes of waste reported in the TSDR Survey as land disposed in 1986 that require alternative treatment/recovery capacity were adjusted to reflect the fact that treatment in surface impoundments after November 1988 may be conducted only in impoundments meeting minimum technological requirements. Volumes of waste that were reported as undergoing treatment in impoundments meeting these requirements in 1988, or in impoundments being replaced by tank systems by 1988, were dropped from further analysis. Residuals from the treatment of these wastes in minimum technology impoundments or tanks were assumed to require further treatment prior to land disposal and therefore are included in the capacity analysis for this final rule. The waste volumes requiring alternative capacity were identified by RCRA waste code(s) and by their land disposal ban regulatory status (i.e., solvents and dioxins, First Third, Second Third, Third Third, and California list). A detailed discussion of this methodology is presented in Subsection 4.1.1.

To determine the type of alternative capacity required by the affected wastes, a "treatability analysis" was performed on each waste stream. Wastes were placed into "treatability groups" using the waste code, the physical/chemical form data, and information on prior management and the type of land disposal, and then considering the identified BDAT technologies. For example, all wastes requiring liquid incineration would be placed in the same treatability group. The physical/chemical form data were provided by the facility using qualitative technical criteria, not regulatory definitions. For example, liquid wastes were identified as "highly fluid" rather than as "wastes failing the Paint Filter Liquids Test."

Waste groups (i.e., waste streams described by more than one waste code) present special treatability concerns because they often contain constituents requiring different types of treatment (e.g., organics and metals). To treat these wastes, a treatment train must be developed that can treat all waste types in the group. A more detailed description of the treatability analysis methodology, including treatment train development, is presented in Subsection 4.1.2.

A number of the treatment technologies to which wastes have been assigned create treatment residuals that will require further treatment prior to land disposal (e.g., stabilization of incinerator ash). In these cases, EPA has estimated the amount of residuals that would be generated by treatment of the original volume of waste and has included these residuals in the volumes requiring treatment capacity. A more detailed description of the determination of residual volumes is presented in Subsection 4.1.2(4).

For a number of wastes, BDAT includes treatment of incinerator scrubber water. Based on TSDR Survey responses, the RCRA-permitted incinerators have adequate air pollution control devices (APCDs) (including scrubber water treatment at those facilities with wet scrubbers), and therefore no additional analysis of the volume of scrubber water was made. However, if the resultant scrubber water treatment sludge would likely require further treatment (e.g., stabilization), these residuals were included in the volumes requiring treatment capacity.

(2) Available Capacity

To obtain estimates of available capacity that could be compared with the capacity requirements of affected wastes, a "systems" approach was taken. A system is defined as one or more different processes used together in one or more different units to treat or recover hazardous waste. The capacity of the treatment/recovery system may be limited by the capacity of one or more of the unit processes within the system. The available capacity of the system is determined by subtracting the utilized capacity of the system from the maximum capacity of the system. A detailed discussion of system capacity determination can be found in Subsection 4.2.2.

Comparing required capacity with available capacity begins at the facility level and moves to the national level, as dictated by the available capacity and commercial status of applicable treatment/recovery systems. The available capacity of systems identified as private is considered only when it is BDAT, and only for the wastes reported as being land disposed at that facility. Waste volumes assigned to onsite BDAT technologies are not considered in the national totals of required commercial capacity.

The remaining volumes of waste still requiring treatment capacity are added to determine the national demand for commercial capacity of each alternative technology. Consequently, all estimates of capacity presented in this document represent commercially available (not private) capacity.

By comparing the required capacity with the available commercial capacity, EPA can identify capacity shortfalls and make determinations concerning variances. The comparative capacity analysis accounts for the sequential and cumulative effects of previous land disposal restrictions, capacity variances, and projected capacity changes after 1986 (the baseline year). Solvents and dioxin wastes were assigned to available capacity first, followed by California list HOCs (other than those that are also First Third or Third Third promulgated wastes), First Third promulgated wastes, Second Third promulgated wastes, and finally Third Third promulgated wastes. In addition, available capacity was first assigned to all affected wastes land disposed in "surface" units (i.e., waste piles, surface impoundments, landfills, and land treatment), and then to underground injected wastes. EPA believes that land disposal in surface units may represent a greater threat to human health and the environment than does the underground injection of wastes.

2.2 Results

The following subsections present the results of the capacity analyses conducted for this final rulemaking and previous rulemakings. All land disposed hazardous wastes, including those capable of being treated onsite in BDAT systems and wastes stored only in land disposal units, are included in the overview tables. As mentioned earlier, land disposed wastes capable of being treated onsite in a BDAT system have not been included in the national estimates of required capacity; therefore, only commercially available capacity is presented in this document. In addition, the amount of commercial capacity available for each rulemaking always considers the amount used by previous rulemakings.

2.2.1 All RCRA Wastes

Table 2-1 presents estimates of the volumes of RCRA wastes that are surface land disposed annually. These volumes were compiled by adding all waste stream volumes managed by treatment, storage, or disposal in surface land disposal units. Separate waste volumes are shown for storage and treatment in waste piles; treatment, storage, and disposal in surface impoundments; and disposal in landfills and land treatment units. The baseline data for determining the volumes in Table 2-1 were the 1986 data from responses to the TSDR Survey. These reported 1986 volumes were adjusted by subtracting the volumes of waste managed in treatment surface impoundments that have undergone closure and have been replaced by tanks or that have been retrofitted to meet minimum technology requirements. (Data reported in tons were converted to gallons (using the conversion factor of 240 gallons/ton, based on the density of water), to allow comparisons to available capacity in a standard unit).

To avoid double-counting of wastes that underwent more than one management operation in the same type of unit (e.g., storage and treatment in a waste pile), the following procedures were used:

- In tabulating volumes of waste managed in surface impoundments and waste piles, any wastes that underwent treatment in an impoundment or waste pile were reported in the "treatment" volume.
- Wastes stored in a surface impoundment or waste pile that never underwent treatment in the impoundment or waste pile were reported in the "storage only" volumes.
- In tabulating surface impoundment volumes, wastes that were disposed of in surface impoundments but not also treated in the impoundment were included among "disposal" surface impoundment volumes.

Not represented in the estimates in Table 2-1 are volumes of surface land disposed waste from facilities that did not return their TSDR Surveys before April 1989 or did not provide sufficient data on land disposal. Based on the limited information provided by these facilities, EPA estimates that these facilities accounted for approximately 8 million gallons of land disposed waste in 1986. This represents less than 1 percent of the reported 1988

Table 2-1 Overview of All Surface Disposed RCRA Hazardous Wastes

Surface Land Disposal Practice	Surface disposed volume (million gal/yr)
Storage only	
- Waste piles	92
- Surface impoundments	<1
Treatment	
- Waste piles	63
- Surface impoundments	345
Disposal	
- Landfills	662[a]
- Land treatment	83
- Surface impoundments	218
Total	1,463

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[a] Since the Second Third Final Rule, an additional 62 million gallons of waste has been reported by Chemical Waste Management. These waste quantities were regulated under the following rules: Solvents Rule (2), First Thirds (41), Second Thirds (1), Third Thirds (10), and soils (8).

adjusted volume of surface land disposed hazardous waste. Sufficient data were not available to determine specific management practices and RCRA waste codes associated with these volumes.

2.2.2 Solvents

For the First Third final rule promulgated August 8, 1988, EPA performed a reanalysis of required and available treatment capacity for surface land disposed solvent wastes.[9] This subsection summarizes the results of that analysis. The capacity analysis for underground injected wastes was performed for a separate rulemaking.

Table 2-2 presents estimates of the volume of solvents that are surface land disposed annually, by management practice and by type of land disposal unit. The same procedures described for the analysis of all RCRA wastes were used for estimating solvent volumes. The entire volume of any waste stream, for both single waste streams and waste groups (waste described by more than one waste code), was considered if the waste stream contained any solvent wastes.

The volume of surface land disposed solvent wastes requiring alternative commercial treatment capacity is less than the volume of solvents land disposed. This is because EPA has assumed that the 13 million gallons of solvent wastes that were only stored in impoundments or waste piles do not require alternative treatment capacity (although they may require alternative storage capacity) because they are treated or disposed of elsewhere. Furthermore, the facility-level waste treatability and technology capacity analyses conducted on solvent wastes being land disposed determined that 34 million gallons of these wastes either had already been treated using the BDAT technology or could be treated onsite, and therefore were not included in the volumes requiring alternative commercial treatment/recovery capacity. Based on this, EPA estimates that 52 million gallons of solvent wastes will require alternative treatment/recovery capacity on a commercial basis. This volume

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[9] USEPA, 1988. U.S. Environmental Protection Agency, Office of Solid Waste. Background Document for First Third Wastes to Support 40 CFR Part 268 Land Disposal Restrictions. Proposed Rule. EPA Contract No. 68-01-7053. Washington D.C.: U.S. Environmental Protection Agency.

Table 2-2 Overview of Surface Disposed Solvent Wastes

Surface Land Disposal Practice	Surface disposed volume (million gal/yr)
Storage only	
- Waste piles	2
- Surface impoundments	11
Treatment	
- Waste piles	3
- Surface impoundments	<1
Disposal	
- Landfills	57
- Land treatment	<1
- Surface impoundments	26
Total	99

includes 25 million gallons of soil; therefore, it is estimated that only 27 million gallons of nonsoil solvent wastes will require alternative commercial treatment capacity.[10] Finally, EPA estimates that treatment of this 27 million gallons will generate 4 million gallons of waste residuals that will also require additional alternative treatment capacity.

Table 2-3 presents the estimates of available commercial capacity for the alternative technologies that are applicable to solvent wastes. Also presented are the estimates of annual surface land disposed waste volumes that require alternative commercial capacity based on the facility-level treatability and capacity analyses (not including contaminated soils or underground injected wastes). As evident from the table, EPA determined that, based on the new data available from results of the TSDR Survey, there was adequate capacity for all of the solvent wastes that will require alternative capacity.[11]

2.2.3 Nonsolvent RCRA Wastes Containing Halogenated Organic Compounds (HOCs)

For the First Third final rule, EPA performed a reanalysis of required and available treatment capacity for California list HOCs.[12] This subsection summarizes the results of that analysis. The capacity analysis for underground injected wastes was performed for a separate rulemaking.

Tables 2-4 through 2-6 present estimates of annual surface land disposed volumes for nonsolvent RCRA wastes that are potential California list wastes containing HOCs at concentrations of 1,000 mg/kg or greater. Separate tables are presented for total HOC wastes, HOC wastes that are also First Third

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[10] Note: Originally an additional 16 million gallons of solvent-contaminated wastewater treatment sludge was deemed to require incineration. The sludge, however, results from the treatment of multisource leachate and consequently is evaluated under this final rule and is not now subject to the solvents rule.

[11] USEPA, 1988. U.S. Environmental Protection Agency, Office of Solid. Background Document for First Third Wastes to Support 40 CFR Part 268 Land Disposal Restrictions. Final Rule. EPA Contract No. 68-01-7058. Washington, D.C.: U.S. Environmental Protection Agency.

[12] Ibid.

Table 2-3 Solvent Capacity Analysis[a]

Technology	Available capacity (million gal/yr)	Required capacity (million gal/yr)
Combustion		
- Liquids	340	2
- Sludges/solids	44	23
Stabilization of incinerator ash	751	4
Wastewater treatment		
- Cyanide oxidation, chemical precipitation, and settling/filtration	41	<1
- Steam stripping, carbon adsorption biological treatment, or wet-air oxidation	57	2
- Chromium reduction and chemical precipitation	125	<1
- Carbon adsorption, chromium reduction, and chemical precipitation	31	<1

[a] Based on 1988 TSDR Survey data.

Table 2-4 Overview of Surface Disposed Potential California List Wastes Containing Halogenated Organic Compounds

Management practice	Surface disposed volume (million gal/yr)
Storage only	
- Waste piles	1
- Surface impoundments	<1
Treatment	
- Waste piles	7
- Surface impoundments	6
Disposal	
- Landfills	20
- Land treatment	<1
- Surface impoundments	<1
Total	34

Table 2-5 Overview of Surface Disposed First Third Promulgated Wastes Containing Halogenated Organic Compounds

Management practice	Surface disposed volume (million gal/yr)
Storage only	
- Waste piles	1
- Surface impoundments	<1
Treatment	
- Waste piles	7
- Surface impoundments	<1
Disposal	
- Landfills	8
- Land treatment	<1
- Surface impoundments	<1
Total	16

Table 2-6 Overview of All Other Surface Disposed Wastes Containing Halogenated Organic Compounds

Management practice	Surface disposed volume (million gal/yr)
Storage only	
- Waste piles	<1
- Surface impoundments	<1
Treatment	
- Waste piles	<1
- Surface impoundments	6
Disposal	
- Landfills	12
- Land treatment	<1
- Surface impoundments	<1
Total	18

promulgated wastes, and all other HOC wastes. The same procedures used for tabulating all RCRA wastes apply to HOC volumes. However, the total volume for each management practice in Tables 2-4 through 2-6 represents the sum of all single HOC waste streams (in that table's regulatory group) and all waste groups containing at least one potential HOC waste (in that table's regulatory group) but containing no solvents.

The volume of land disposed HOC wastes requiring alternative commercial treatment capacity is less than the volume of HOC wastes land disposed. This is because the facility-level treatability and capacity analyses conducted on the HOC wastes being land disposed determined that 3 million gallons of these wastes could be treated onsite and therefore were not included in the volume requiring alternative commercial treatment capacity. Based on this, EPA estimates that 18 million gallons of HOC wastes will require alternative treatment capacity on a commercial basis. This volume includes 6 million gallons of soils (2 of the 6 million gallons of HOC soils were assigned to onsite treatment); therefore, it is estimated that only 12 million gallons of nonsoil HOC wastes will require alternative commercial treatment capacity.

Table 2-7 presents the results of the facility-level treatability and capacity analyses for non-Third Third promulgated HOC-containing wastes (not including underground injected waste volumes). To eliminate double-counting, this table does not include wastes that contain First Third promulgated wastes or solvents. In addition, those HOC wastes that are also Third Third promulgated wastes have been included in the capacity analysis for Third Third promulgated wastes and not here.

Based on the data from the TSDR Survey, EPA determined that adequate capacity exists for the volume of HOC wastes requiring combustion. Consequently, EPA rescinded the national capacity variance previously granted to these wastes.[13]

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[13] USEPA, 1988. U.S. Environmental Protection Agency, Office of Solid Waste. Background Document for First Third Wastes to Support 40 CFR Part 268 Land Disposal Restrictions. Final Rule. EPA Contract No. 68-01-7053. Washington, D.C.: U.S. Environmental Protection Agency.

Table 2-7 Capacity Analysis for HOC Wastes
(Excluding First Third Promulgated and Third Third Promulgated HOCs)[a]

Technology	Available capacity (million gal/yr)	Required capacity (million gal/yr)
Combustion		
- Sludges/solids	21	<1

[a] Based on 1988 TSDR Survey data.

2.2.4 First Third Wastes

In support of the First Third final rule, EPA performed facility-level treatability and capacity analyses on First Third waste streams.[14] This subsection documents the results of the capacity analysis for the First Third wastes. As previously mentioned, the First Third final rule did not include underground injected wastes.

(1) All First Third Wastes

Table 2-8 presents the estimates of all First Third wastes (as listed in 40 CFR 268.10) that are surface land disposed annually, by management practice and by type of disposal unit. The total volume for each category in Table 2-8 represents the sum of all single First Third waste streams and all waste groups containing at least one First Third waste but no solvents. This prevents double-counting of multiple waste streams that contain both First Third wastes and solvents.

(2) First Third Wastes for which Formal Treatment Standards have been Promulgated

Table 2-9 presents estimates of the annual volume of First Third wastes surface land disposed for which treatment standards were promulgated, by management practice and by type of disposal unit. These wastes are referred to hereafter as First Third promulgated wastes. The same procedures described for the analysis of all RCRA wastes were used for estimating First Third promulgated waste volumes. The total volume for each category in Table 2-9 represents the sum of all single First Third promulgated waste streams and all waste groups containing at least one First Third promulgated waste but no solvents. This prevents double-counting of multiple waste streams that contain First Third promulgated wastes and solvents.

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[14] USEPA, 1988. U.S. Environmental Protection Agency, Office of Solid Waste. Background Document for First Third Wastes to Support 40 CFR Part 268, Land Disposal Restrictions, Final Rule. EPA Contract No. 68-01-7053. Washington D.C.: U.S. Environmental Protection Agency.

Table 2-8 Overview of All Surface Disposed First Third Wastes

Management practice	Surface disposed volume (million gal/yr)
Storage only	
- Waste piles	49
- Surface impoundments	6
Treatment	
- Waste piles	29
- Surface impoundments	328
Disposal	
- Landfills	343
- Land treatment	76
- Surface impoundments	71
Total	902

Table 2-9 Overview of Surface Disposed First Third Promulgated Wastes[a]

Management practice	Land disposed volume (million gal/yr)
Storage only	
- Waste piles	41
- Surface impoundments	4
Treatment	
- Waste piles	27
- Surface impoundments	320
Disposal	
- Landfills	315
- Land treatment	76
- Surface impoundments	70
Total	853

[a] First Third promulgated wastes are those wastes for which treatment standards were finalized on August 8, 1988.

The volume of land disposed First Third promulgated wastes requiring alternative commercial treatment capacity is less than the volume of First Third promulgated wastes land disposed. This is because EPA has assumed that 35 million gallons of the 45 million gallons that were only stored in impoundments or waste piles do not require alternative treatment capacity because they are treated or disposed of elsewhere (although they may require alternative storage capacity). The 10 million gallons of "stored only" wastes that do require alternative capacity were determined to have undergone "long-term storage" and therefore would not have been reported elsewhere as treated or disposed of. Furthermore, the facility-level waste treatability and technology capacity analyses conducted on First Third wastes being land disposed determined that 341 million gallons of these wastes either had already been treated or could be treated onsite using the BDAT technology and therefore do not require alternative commercial treatment capacity. This volume includes 290 million gallons of wastewater from one facility assigned to onsite dewatering in tanks.

Table 2-10 presents estimates of available commercial capacity for the alternative technologies applicable to the First Third promulgated wastes. Also presented are the estimates of annual land disposed waste volumes requiring alternative commercial capacity, excluding First Third promulgated wastes that are underground injected or soils contaminated with First Third promulgated wastes which were granted a two-year capacity variance. In most cases, adequate capacity was available to treat all of the First Third promulgated wastes and mixed waste groups containing a First Third promulgated waste.

As Table 2-10 shows, four technologies had required capacity exceeding the available capacity: acid leaching of sludges, high temperature metals recovery, solvent extraction, and combustion of sludges/solids.

BDAT for K071 was identified as acid leaching of the sludge. Because of the shortfall of acid leaching capacity, EPA granted a two-year national capacity variance for K071 wastes.

Table 2-10 Capacity Analysis for First Third Promulgated Wastes

Technology	Available capacity (million gal/yr)	Required commercial capacity (million gal/yr)
Combustion		
- Liquids	338	<1
- Sludges/solids	21	218 - 162[a]
Stabilization	747	263[b]
Solvent extraction	1	0 - 154
Metals recovery		
- High temperature metals recovery (not secondary smelting)	34	63
Wastewater treatment		
- Chromium reduction, chemical precipitation, and settling/filtration	125	46
- Carbon adsorption and chromium reduction, chemical precipitation, and settling/filtration	31	1
- Alkaline chlorination and chemical precipitation	41	6[c]
Sludge Treatment		
- Acid leaching, chemical oxidation, and dewatering of sludge and sulfide precipitation of effluent	0	4

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[a] Eight million gallons of non-K048-K052 wastes require sludge/solids combustion. Amount of K048-K052 sludge/solids requiring combustion may be as much as 154 million gallons. The alternative BDAT technology for these wastes is solvent extraction.

[b] This volume includes 63 million gallons of "high zinc" K061 also assigned to high temperature metals recovery.

[c] Required commercial capacity for F006 nonwastewaters has been revised. A detailed discussion of the F006 analysis can be found in the Second Third rule Executive Summary.

High temperature metals recovery (HTMR) was identified as the BDAT for "high zinc" K061 (i.e., K061 containing ≥15 percent zinc). Because of the shortfall of HTMR capacity, EPA granted a two-year capacity variance to the HTMR standard for high zinc K061. However, during this two-year variance period, EPA is requiring that high zinc K061 meet the standard for low zinc K061, which is based on stabilization. Therefore, 63 million gallons of K061 waste have been "double-counted" on Table 2-10 under both stabilization and HTMR.

The required capacity for the combustion of sludges/solids was divided into two numbers: the total amount of waste that requires sludge/solid combustion, 162 million gallons, and the amount of First Third promulgated waste other than K048-K052 waste that requires sludge/solid combustion, 8 million gallons. The BDAT standard for K048-K052 was also based on solvent extraction, however, and thus the required capacities for these technologies are presented as ranges on Table 2-10. The total volume of K048-K052 wastes requiring capacity has been determined to be 154 million gallons. Consequently, because of a shortfall of sludge/solid incineration and solvent extraction capacity, EPA granted a two-year national capacity variance for K048-K052 wastes.

(3) Soft Hammer Wastes from the First Third Final Rule

The First Third soft hammer wastes for which treatment standards were not promulgated in the First Third final rule (i.e., "soft hammer" First Third wastes) include F006 wastewaters, F019, K004, K008, K011 wastewaters, K013 wastewaters, K014 wastewaters, K017, K021 wastewaters, K022 wastewaters, K031, K035, K046, K061 wastewaters, K069 wastewaters, K073, K084,K085, K086 nonwastewaters, K101, K102 nonwastewaters K106, P001, P004, P005, P010, P011, P012, P015, P016, P018, P020, P036, P037, P048, P050, P058, P059, P068, P069, P070, P081, P082, P084, P087, P092, P102, P105, P108, P110, P115, P120, P122, P123, U007 nonwastewaters, U009, U010, U012, U016, U018, U019, U022, U031, U036, U037, U041, U043, U044, U046, U050, U051, U053, U061, U063, U064, U066, U067, U074, U077, U078, U086, U089, U103, U105, U108, U115, U122, U124, U129, U130, U133, U134, U137, U151, U154, U155, U157, U158, U159,U177, U180, U185, U188, U192, U200, U209, U210, U211, U219, U220, U226, U227, U228, U237, U238, U248, and U249 wastes. Treatment standards for some of the soft hammer wastes from the First Third final rule were promulgated in the Second Third final rule. Treatment standards for the remainder are being promulgated in today's final rule.

2.2.5 Underground Injected Solvent Wastes

On July 26, 1988 (53 FR 28118), EPA published the final rule regulating underground injection of F001-F005 solvents and of F020-F023 and F026-F028 dioxin wastes. The results of the capacity analysis for these wastes are presented in Table 2-11.

EPA used the data resulting from the TSDR Survey to estimate the amount of required alternative commercial treatment capacity. For this rule, EPA estimated that 317 gallons of solvent wastes are underground injected annually. The TSDR Survey does not contain detailed data on the concentration of contaminants in wastes; however, based on waste descriptions, EPA estimated that at least 260 million gallons were solvent-water mixtures containing less than 1 percent total F001-F005 solvent constituents at the point of generation. The appropriate treatment for these wastes was identified as wastewater treatment for organics (steam stripping, carbon adsorption, biological treatment, or wet-air oxidation). Using the TSDR Survey, EPA identified only 55 million gallons of available commercial wastewater treatment for organics. Consequently, EPA granted a national capacity variance for solvent-water mixtures with less than 1 percent total F001-F005 solvent constituents until August 8, 1990.

EPA estimated that the remaining 57 million gallons of underground injected solvent wastes contained F001-F005 constituents in concentrations greater than or equal to 1 percent at the point of generation. The BDAT standard for these wastes is based on the performance of liquid combustion. Using the TSDR Survey, EPA identified 338 million gallons of available liquid combustion capacity. EPA, therefore, did not grant a national capacity variance to those wastes.

Table 2-11 Capacity Analysis for Underground Injected Solvent Wastes[a]

Technology	Available capacity (million gal/yr)	Required capacity (million gal/yr)
Combustion		
- liquids	338	57
Wastewater treatment		
- stream stripping, carbon adsorption, biological treatment, or wet-air oxidation	55	260

[a] Based on 53 FR 28118-28155.

EPA determined that F020-F023 and F026-F028 dioxin wastes were not being underground injected and that restricting them would have a negligible effect on available treatment capacity; EPA, therefore, did not grant a two-year capacity variance to these wastes.

2.2.6 Underground Injected California List Wastes

On August 16, 1988, EPA published its regulatory approach for underground injected California list wastes. The results of the capacity analysis for these wastes are shown on Table 2-12. This subsection summarizes the capacity determinations for each California list waste type.

(1) Free Cyanides

For this rule, EPA determined that 1.36 billion gallons of cyanide wastes are underground injected annually. EPA estimated that at least 170 million gallons of this waste exceeded the statutory prohibition level of 1,000 mg/l. Using the TSDR Survey, EPA identified only 16 million gallons of available cyanide oxidation capacity. Consequently, EPA granted a national capacity variance to underground injected California list cyanide wastes until August 8, 1990.

(2) Metals

EPA estimated that 234 million gallons of waste exceeding the California list standards for metals (other than chromium) are underground injected annually. Using the TSDR Survey available at the time, EPA identified 128 million gallons of available commercial chemical precipitation capacity. Consequently, EPA granted a national capacity variance to underground injected California list metal-bearing wastes until August 8, 1990.

(3) Chromium wastes

EPA identified 105 million gallons of wastes with chromium levels exceeding the California list limits. EPA also identified an additional 237 million gallons of wastes that could potentially exceed the chromium levels. Using the TSDR Survey, EPA determined that 79 million gallons of chromium

Table 2-12 Capacity Analysis for Underground Injected California List Wastes[a]

Technology	Available capacity (million gal/yr)	Required capacity (million gal/yr)
Combustion		
- liquids	281	[b]
Cyanide oxidation	16	>170
Chemical precipitation	364[c]	234
Neutralization	36	>1,000
Wastewater treatment for organics (steam stripping, carbon adsorption, biological treatment, or wet-air oxidation)	55	245
Chromium reduction, chemical precipitation, and settling or filtration	79	105-342

[a] Based on 53 FR 30908-30918.

[b] Exact volume is not known; determined to be "substantially less" than available capacity.

[c] At the time the California list rule went into effect, the available capacity for chemical precipitation was determined to be 128 million gallons. As a result, 234 million gallons of waste requiring chemical precipitation were granted a two-year national capacity variance. Since promulgation of the California list rule, EPA has received additional information. The 364 million gallons reported today is based on this additional information.

reduction, chemical precipitation, and settling or filtration capacity was available to treat these wastes. Thus, EPA decided to grant a national capacity variance to underground injected California list chromium wastes until August 8, 1990.

(4) Corrosives

EPA identified over 1 billion gallons of underground injected acidic corrosive (pH ≤ 2) wastes subject to the California list prohibitions. Using the TSDR Survey, EPA identified only about 36 million gallons of available commercial neutralization capacity. Consequently, EPA granted a national capacity variance to underground injected California list corrosive wastes until August 8, 1990.

(5) Halogenated Organic Compounds (HOCs)

EPA divided California list HOC wastes into two subgroups: concentrated HOC wastes containing greater than or equal to 10,000 mg/l (1 percent) HOC constituents, and dilute wastewaters with HOC concentrations between 1,000 and 10,000 mg/l. In addition, wastes that qualify as both HOCs and First Third promulgated wastes were included with the First Third promulgated wastes and not with the HOCs to avoid double counting.

EPA determined that the volume of concentrated HOC wastes being underground injected was substantially less than the amount of available liquid combustion capacity (the specified BDAT for these wastes). EPA, therefore, did not grant a national capacity variance to underground injected California list wastes with HOC concentrations greater than or equal to 10,000 mg/l.

Using the TSDR Survey, EPA identified 245 million gallons of underground injected dilute HOC wastewaters (HOCs between 1,000 and 10,000 mg/l). EPA identified only 55 million gallons of available wastewater treatment capacity applicable to these wastes (steam stripping, carbon adsorption, biological treatment, or wet-air oxidation). Consequently, EPA granted a national capacity variance to underground injected dilute California list HOC wastewaters until August 8, 1990.

(6) Polychlorinated Biphenyls (PCBs)

EPA identified 25,000 gallons of underground injected PCBs; however, EPA does not believe that these wastes exceed the statutory prohibition level of 50 ppm. Furthermore, data from both the TSDR Survey and the RIA Mail Survey indicate that treatment capacity for these wastes (liquid combustion) substantially exceeds the volume injected. EPA, therefore, did not grant a national capacity variance to underground injected California list PCB wastes.

2.2.7 Underground Injected First Third Wastes

EPA's regulatory approach for underground injected First Third wastes was outlined in two parts. The first part, published on August 16, 1988 (53 FR 30908), covered underground injected K049-K052, K062, K071, and K104 wastes. EPA's published regulations on the remaining underground injected First Third wastes were published on June 14, 1989 (54 FR 25416). Table 2-13 summarizes the capacity analyses for Underground Injected First Third wastes.

(1) K062 Wastes

EPA determined that between 128 and 148 million gallons of K062 wastes, spent pickle liquor, are underground injected each year. The BDAT standard for K062 wastes is based on chromium reduction, chemical precipitation, and sludge dewatering. Using the TSDR Survey, EPA identified only 79 million gallons of available chromium reduction capacity. Consequently, EPA granted a national capacity variance to K062 wastes until August 8, 1990.

(2) K049, K050, K051, and K052 Wastes

K049-K052 are petroleum refining wastes. The BDAT standard for these wastes is based on sludge incineration or solvent extraction followed by stabilization. EPA determined that about 656,000 gallons of these wastes are underground injected annually. Based on the limited treatment capacity available, and the decision to allocate available treatment first to surface disposed wastes, EPA granted a national capacity variance to underground injected K049-K052 wastes until August 8, 1990.

Table 2-13 Capacity Analysis for Underground Injected First Third Wastes[a]

Technology	Available capacity (million gal/yr)	Required capacity (million gal/yr)
Combustion		
- liquids	281	<1
Chromium reduction, chemical precipitation, and settling or filtration	79	128-148
Solvent extraction followed by steam stripping and carbon adsorption	1	57
Acid leaching followed by chemical oxidation, dewatering of sludges, and sulfide precipitation	0	<1
Biological treatment followed by wet-air oxidation	0	118
Biological treatment	51	<1

[a] Based on 53 FR 30908-30918 and 53 FR 40400-40408.

(3) K104 Wastes

K104 wastes are wastewaters generated from production of nitrobenzene and aniline. The BDAT standard for K104 wastes was based on solvent extraction followed by steam stripping and carbon adsorption. The TSDR Survey indicates that nearly 57 million gallons of K104 are being underground injected each year. EPA, however, identified only 1 million gallons of available solvent extraction capacity. Consequently, EPA granted a national capacity variance to underground injected K104 wastes until August 8, 1990.

(4) K071 Wastes

K071 waste is brine purification muds from mercury cell production of chlorine. The BDAT standard for K071 is based on acid leaching followed by chemical oxidation, dewatering of sludges, and sulfide precipitation of metals in the effluent. Although EPA determined that only about 45,000 gallons of K071 waste is underground injected each year, EPA believes that there is inadequate capacity to treat these wastes. Consequently, EPA granted a national capacity variance to underground injected K071 wastes until August 8, 1990.

(5) K016 Wastes

K016 waste is heavy ends or distillation residues from the production of certain halogenated hydrocarbons. The BDAT standard for dilute (less than 1 percent) K016 wastes is based on biological treatment followed by wet-air oxidation; for K016 wastes in concentrations equal to or greater than 1 percent, the BDAT standard is based on liquid combustion. Using the TSDR Survey, EPA identified 118 million gallons of underground injected dilute (less than 1 percent) K016 wastes. EPA did not identify any available capacity for dilute K016 wastes. Consequently, EPA granted a national capacity variance to underground injected dilute (less than 1 percent) K016 wastes until August 8, 1990.

Using the TSDR Survey, EPA identified only 170,000 gallons of underground injected concentrated K016 wastes (greater than 1 percent) and 281 million gallons of available liquid combustion capacity. EPA, therefore, did not grant a national capacity variance to underground injected concentrated (greater than 1 percent) K016 wastes.

(6) K019 Wastes

K019 is heavy ends or distillation residues from the production of ethylene dichloride. EPA determined that only 65,000 gallons of relatively dilute K019 wastes are being underground injected and that the most appropriate treatment would be biological degradation. Using the TSDR Survey, EPA identified 47 million gallons of available biological treatment capacity. EPA, therefore, did not grant a national capacity variance to underground injected K019 wastes.

(7) K030 Wastes

K030 is column bottoms and heavy ends from production of trichloroethylene and perchloroethylene. Using the TSDR Survey, EPA identified 30,000 gallons of underground injected K030. As with K019, EPA determined that the underground injected K030 waste is relatively dilute and is best treated by biological treatment. EPA, therefore, did not grant a national capacity variance for underground injected K030 wastes.

(8) K103 Wastes

K103 wastes are residues from the production of aniline. EPA determined that 31,560 gallons of K103 waste was being underground injected annually. EPA believes that these wastes are relatively concentrated and would therefore require liquid combustion. EPA identified 281 million gallons of available liquid combustion capacity. EPA, therefore, did not grant a national capacity variance to underground injected K103 wastes.

2.2.8 Second Third Wastes

In support of the Second Third final rule, EPA performed facility-level treatability and capacity analyses on Second Third waste streams.[15] This subsection documents the results of the capacity analysis for the Second Third wastes.

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[15] USEPA. 1989. U.S. Environmental Protection Agency, Office of Solid Waste. Background Document for Second Third Wastes to Support 40 CFR Part 268 Land Disposal Restrictions. Final Rule. Vols. I and II. EPA Contract No. 68-01-7053. Washington, D.C.: U.S. Environmental Protection Agency.

(1) Overview

EPA finalized its regulatory approach for Second Third wastes on June 8, 1989.[16] However, EPA did not set standards for all Second Third wastes at that time, but instead allowed the soft hammer requirements to take effect for those Second Third wastes for which standards were not promulgated. In addition, EPA established treatment standards for some "soft hammer" First Third wastes as well as some wastes that were originally Third Third wastes.

(2) All Second Third Wastes

Table 2-14 presents the estimates of all Second Third wastes (as listed in 40 CFR 268.10) that are land disposed annually, by management practice and by type of disposal unit. The total volume for each category in Table 2-14 represents the sum of all single Second Third waste streams and all waste groups containing at least one Second Third waste but no solvents or First Third wastes. This prevents double-counting of multiple waste streams that contain both Second Third wastes and solvents or First Third wastes.

(3) Second Third Wastes for Which Formal Treatment Standards Have Been Promulgated.

Table 2-15 presents estimates of the volume of Second Third promulgated wastes land disposed annually, by management practice and by type of land disposal unit. These estimates include the entire volume of any waste stream, for both single waste streams and waste groups, if the waste stream contained any Second Third promulgated waste but no solvent, First Third waste for which a standard has been finalized, or California list HOC wastes. The estimates also include volumes for waste streams containing soft hammer First Third wastes and Third Third wastes for which treatment standards were promulgated in the Second Third rule.

The volume of land disposed Second Third promulgated wastes requiring alternative commercial treatment capacity is less than the volume of Second Third promulgated wastes land disposed. This is because EPA has assumed that the 4 million gallons that were only stored in impoundments or waste piles do not require alternative treatment capacity because they are treated or

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[16] Ibid.

Table 2-14 Overview of Second Third Promulgated Wastes[a]

Management practice	Land disposed volume (million gal/yr)
Storage only	
- Waste piles	1
- Surface impoundments	3
Treatment	
- Waste piles	5
- Surface impoundments	<1
Disposal	
- Landfills	11
- Land treatment	<1
- Surface impoundments	<1
- Underground injection	604
Total	624

[a] Second Third promulgated wastes are those wastes for which treatment standards were finalized in June 8, 1989.

Table 2-15 Overview of Surface Disposed Second Third Promulgated Wastes[a]

Management practice	Surface disposed volume (million gal/yr)
Storage only	
- Waste piles	1
- Surface impoundments	3
Treatment	
- Waste piles	5
- Surface impoundments	<1
Disposal	
- Landfills	11
- Land treatment	<1
- Surface impoundments	<1
Total	20

Table 2-14 Overview of Second Third Promulgated Wastes[a]

Management practice	Land disposed volume (million gal/yr)
Storage only	
- Waste piles	1
- Surface impoundments	3
Treatment	
- Waste piles	5
- Surface impoundments	<1
Disposal	
- Landfills	11
- Land treatment	<1
- Surface impoundments	<1
- Underground injection	604
Total	624

[a] Second Third promulgated wastes are those wastes for which treatment standards were finalized in June 8, 1989.

Table 2-15 Overview of Surface Disposed Second Third Promulgated Wastes[a]

Management practice	Surface disposed volume (million gal/yr)
Storage only	
- Waste piles	1
- Surface impoundments	3
Treatment	
- Waste piles	5
- Surface impoundments	<1
Disposal	
- Landfills	11
- Land treatment	<1
- Surface impoundments	<1
Total	20

disposed of elsewhere (although they may require alternative storage capacity; for more detail on "stored only" waste volumes see Subsection 4.1.1). Furthermore, the facility-level waste treatability and technology capacity analyses conducted on Second Third promulgated wastes being land disposed determined that 22 million gallons of these wastes either had already been treated or could be treated onsite using the BDAT technology and therefore do not require alternative commercial treatment capacity.

Based on this analysis, EPA estimates that 598 million gallons of Second Third promulgated wastes will require alternative commercial treatment capacity. EPA estimates that treatment of the 598 million gallons will generate 5 million gallons of waste residuals that will require additional alternative treatment capacity.

(4) Surface Disposed Second Third Promulgated Wastes

Table 2-16 shows the estimates of the volume of surface land disposed Second Third promulgated wastes that require alternative commercial treatment recovery capacity. These estimates are based on the results of the TSDR Survey.

A comparison of required and available treatment/recovery capacity shows adequate capacity for all surface disposed Second Third promulgated wastes. However, in order to allow time for facilities to adjust existing cyanide treatment processes to operate more efficiently, EPA determined to grant a 30-day variance from the cyanide standards for F006 nonwastewaters and F007, F008, and F009 wastewaters and nonwastewaters.

In addition, because F011 and F012 heat treating wastes are often commingled with F006, F007, F008, and F009 electroplating wastes, EPA expects that they will have to be segregated and treated separately. In order to allow some time to adjust processes to segregate these heat treating (F011, F012) and electroplating wastes (F006, F007, F008, F009), EPA deferred the total and amenable cyanide standards for F011 and F012 heat treating wastes until December 8, 1989. However, between July 8, 1989, and December 8, 1989, these wastes were subject to the same cyanide standards as the electroplating wastes (F006, F007, F008, F009).

Table 2-16 Capacity Analysis for Surface Disposed Second Third Promulgated Wastes[a]

Technology	Available capacity (million gal/yr)	Required capacity (million gal/yr)
Combustion		
- Liquids	281	<1
- Sludges/solids	13	9
Wastewater treatment		
- Alkaline chlorination and chemical precipitation	16	5
- Eletrolytic oxidation followed by alkaline chlorination	0	0[b]
- Carbon adsorption	2	0
- Biological treatment	44	<1
- Steam stripping followed by biological treatment	0	0
- Chrome reduction and chemical precipitation	79	<1
- Chemical precipitation	364	<1
Stabilization	484	4

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[a] Volumes do not include underground injected waste and soils/debris.

[b] These wastes have been included with the wastes requiring alkaline chlorination.

EPA did not grant a national capacity variance to any other surface disposed Second Third promulgated wastes.

(5) Underground Injected Second Third Promulgated Wastes

Table 2-17 presents the amount of required and available commercial treatment recovery capacity for underground injected Second Third promulgated wastes. The amount of available commercial capacity presented is that amount remaining after accounting for surface disposed Second Third wastes. The amount of available commercial capacity and most of the required capacity were estimated using the TSDR Survey. For some waste codes for which the TSDR Survey did not contain data on the volume being underground injected, EPA used the Office of Drinking Water's (ODW's) Hazardous Waste Injection Well Data Base (HWIWDB) to estimate the volume of these wastes underground injected.[17]

The table shows shortfalls in available capacity for cyanide destruction, incineration, and wastewater treatment of organics. Treatment standards based on alkaline chlorination were promulgated for F007, F008, F009, F011, F012, F019, P013, P021, P029, P030, P063, P074, P098, P099, P104, P106, and P121 wastes. EPA estimates that about 126 million gallons per year of underground injected Second Third promulgated wastes will require alkaline chlorination. However, one F007 waste stream accounts for 126 million gallons per year of the required capacity. Excluding this stream, adequate capacity exists to treat the small volumes required for the remainder of these wastes. Consequently, of the waste requiring alkaline chlorination, EPA granted a two-year national capacity variance only for F007 wastes, which are underground injected.

In addition, as previously mentioned, EPA granted a 30-day variance from the cyanide standards to F006 nonwastewaters and F007, F008, and F009 wastewaters and nonwastewaters. EPA also deferred the cyanide standards for F011 and F012 until December 8, 1989. However, between July 8, 1989, and December 8, 1989, F011 and F012 wastes were subject to the same cyanide standards as the electroplating wastes (F006, F007, F008, and F009).

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[17] Temple, Barker & Sloane, Inc. 1987. Findings on Class I hazardous wells affected by the land ban rules. Memorandum report to John Atcheson, Dave Morganvalp, and Mario Salazar, USEPA, from TBS, December 15, 1987.

Table 2-17 Capacity Analysis for Underground Injected Second Third Promulgated Wastes

Technology	Available capacity (million gal/yr)	Required capacity (million gal/yr)
Combustion		
- Liquids	281	379
Wastewater treatment		
- Alkaline chlorination and chemical precipitation	11	126
- Electrolytic oxidation followed by alkaline chlorination	0	<1
- Carbon adsorption	2	<1
- Biological treatment	44	<1
- Steam stripping followed by biological treatment	0	79
Stabilization	480	1

The treatment standard for K009 nonwastewaters is based on incineration; for wastewaters it is based on steam stripping followed by biological treatment. In the capacity analysis for K009 wastes, only wastewaters were identified as requiring alternative treatment. Table 2-17 shows that insufficient wastewater treatment capacity exists for the volume of K009 waste that is underground injected. EPA therefore granted a two-year national capacity variance to underground injected K009 wastewaters.

The treatment standard for K011 and K013 nonwastewaters is based on incineration. Table 2-17 shows that insufficient capacity exists for the volume of underground injected K011 and K013 nonwastewaters requiring incineration. EPA therefore granted a national capacity variance to underground injected K011 and K013 wastes.

EPA determined that sufficient capacity exists for the remainder of the underground injected Second Third promulgated wastes. However, as previously mentioned, to allow time (if any is needed) for facilities to adjust existing cyanide treatment processes to operate more efficiently, EPA determined to grant a 30-day variance from the cyanide standards for F006 nonwastewaters and F007, F008, and F009 wastewaters and nonwastewaters.

In addition, because F011 and F012 heat treating wastes are often commingled with F006, F007, F008, and F009 electroplating wastes, EPA expects that they will have to be segregated and treated separately. To allow some time to adjust processes to segregate these heat treating (F011, F012) and electroplating wastes (F006, F007, F008, F009), EPA deferred the total and amenable cyanide standards for F011 and F012 heat treating wastes until December 8, 1989. However, between July 8, 1989, and December 8, 1989, these wastes will be subject to the same cyanide standards as the electroplating wastes (F006, F007, F008, F009).

(6) First and Second Third Soft Hammer Wastes

Table 2-18 presents "soft hammer" First Third and Second Third wastes. These are the First Third and Second Third wastes for which treatment standards were not promulgated in the First or Second Third final rules.

Table 2-18
Soft Hammer Wastes from the First Third and Second Third Final Rules

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First Third Soft Hammer

F006 wastewaters, F019, K004, K008, K011 wastewaters, K013 wastewaters, K014 wastewaters, K015, K017, K021 wastewaters, K022 wastewaters, K031, K035, K046, K060 wastewaters, K061 wastewaters, K069, K073, K083, K084, K085, K086, K101, K102, K106, P001, P004, P005, P010, P011, P012, P015, P016, P018, P020, P036, P037, P048, P050, P058, P059, P068, P069, P070, P081, P082, P084, P087, P092, P102, P105, P108, P110, P115, P120, P122, P123, U007, U009, U010, U012, U016, U018, U019, U022, U029, U031, U036, U037, U041, U043, U044, U046, U050, U051, U053, U061, U063, U064, U066, U067, U074, U077, U078, U086, U089, U103, U105, U108, U115, U122, U124, U129, U130, U133, U134, U137, U151, U154, U155, U157, U158, U159, U177, U180, U185, U188, U192, U200, U209, U210, U211, U219, U220, U226, U227, U228, U237, U238, U248, and U249.

Second Third Soft Hammer

K025 wastewaters, K029, K041, K042, K095 wastewaters, K096 wastewaters, K097, K098, K105, P002, P003, P007, P008, P014, P026, P027, P049, P054, P057, P060, P066, P067, P072, P107, P112, P113, P114, U002, U003, U005, U008, U011, U014, U015, U020, U021, U023, U025, U026, U032, U035, U047, U049, U057, U059, U060, U062, U070, U073, U080, U083, U092, U093, U094, U095, U097, U098, U099, U101, U106, U109, U110, U111, U114, U116, U119, U127, U128, U131, U135, U138, U140, U142, U143, U144, U146, U147, U149, U150, U161, U162, U163, U164, U165, U168, U169, U170, U171, U172, U173, U174, U176, U178, U179, U189, U193, U196, U203, U205, U206, U208, U213, U214, U215, U216, U217, U218, U239, and U244.

2.2.9 Determination of Available Capacity for the Third Third Final Rule

This section presents EPA's determination of the amount of commercial treatment capacity available for Third Third promulgated wastes.

(1) Effects of Previous Land Disposal Restrictions

Table 2-19 shows the effects of previous land disposal restrictions on available capacity for the Third Third final rule. The table shows EPA's latest estimate of available capacity for each technology. The table also presents the amount of capacity required by each of the previous land disposal restrictions in order of promulgation. The amount required by previous rules is subtracted from the available capacity for each technology to determine the amount remaining, and therefore available, for the Third Third promulgated wastes.

The 1989 data included in the available capacity analysis of the proposed Third Third rule were based on facility projections made in 1987 as reported in the TSDR Survey and limited facility contacts. For the final rule, EPA contacted facilities that anticipated additional available capacity for 1989 to verify projected capacities reported in the TSDR Survey. For alkaline chlorination followed by chemical precipitation 1989 data have been adjusted to reflect this new information.

In addition to the above mentioned revision EPA also revised the available capacity estimate for combustion of sludge and solids. During the public comment period for the proposed Third Third rule, EPA received several comments on available sludge/solid combustion capacity. Commenters indicated that EPA had omitted available units, included units that may not actually be available, and incorrectly estimated capacity for some units. Sources of suggested error included new operating parameters resulting from permits issued since the TSDR Survey, and new hazardous fuel blending and burning techniques that increase capacity for reusing sludges and solids as fuel. Since the statutory deadline for incineration permit decisions passed in November of 1989, EPA agreed that recent permits could have affected national incineration capacity. As a result, EPA has obtained updated information from EPA regional and state environmental regulatory offices (and in a few cases incineration facility's themselves) and has reevaluated available sludge/solid combustion capacity based on these data.

EPA also made revisions to available capacity estimates for four technologies required for the final Third Third rule. These technologies include: 1) alkaline chlorination, 2) biological treatment followed by chemical precipitation; 3) chromium reduction followed by chemical precipitation; and 4) chemical precipitation.

Due to a mathematics error in the Third Third proposed rule, EPA has revised the available capacity estimate for combustion of liquids. This revision had no effect on capacity variances for the final rule.

(2) Impacts of Third Third Final Rule on California List HOCs

The California list final rule for HOCs was not waste code specific, but instead regulated all hazardous wastes containing HOCs above a specified concentration. Consequently, EPA's capacity analysis for HOCs included some Third Third wastes. Table 2-19 presents the available capacity for Third Third Wastes including Third Third HOCs. However, today's final rule is waste code specific and therefore some overlap exists between the California list HOC final rule and the Third Third final rule. In addition, some of the technologies to which Third Third wastes were assigned for the California list final rule may not be appropriate as a result of today's final rule.

EPA has therefore decided to reanalyze all California list HOC wastes subject to this proposal and has included these wastes in the estimates of required capacity as a result of the Third Third final rule. In order to avoid double counting these wastes, however, EPA has subtracted these wastes from required capacity estimates for the California list HOC final rule.

2.2.10 Third Third Promulgated Wastes

(1) Overview

EPA is today promulgating its regulatory approach for Third Third wastes. In addition, EPA is promulgating standards for "soft hammer" First and Second Third wastes, as well as some wastes that were originally included as California list HOCs. Those wastes for which EPA is today setting treatment standards are listed in Table 1-1. These wastes will hereafter be referred to as Third Third promulgated wastes. Waste code-specific capacity analyses for the Third Third promulgated wastes are presented in Section 3.

TABLE 2-19 DETERMINATION OF AVAILABLE COMMERCIAL CAPACITY FOR THIRD THIRD WASTES*

(MILLIONS OF GALLONS/YEAR)

TECHNOLOGY	1990 AVAILABLE CAPACITY	REQUIRED CAPACITY BY:						AVAILABLE CAPACITY TOTAL
		SOLVENTS RULE	SOLVENTS UIW	FIRST THIRDS	FIRST THIRD UIW	SECOND THIRD WASTE	SECOND THIRD WASTE UIW	
Acid leaching followed by chemical precipitation	0	0	0	0**	0**	0	0	0
Alkaline chlorination	7	0	0	0	0	0	0	7
Alkaline chlorination followed by chemical precipitation	17	<1	0	6	0	5	0**	6
Biological treatment	47	0	0	0	<1	<1	0	47
Biological treatment followed by chemical precipitation	14	0	0	0	0	0	0	14
Chemical oxidation followed by chemical precipitation	28	0	0	0	0	0	0	28
Chemical oxidation followed by chromium reduction followed by chemical precipitation	2	0	0	0	0	0	0	2
Chemical precipitation	339	0	0	0	0	<1	0	339
Chromium reduction followed by chemical precipitation	142	<1	0	46	0**	<1	0	96
Combustion of liquids	328	2	57	<1	<1	<1	32**	237
Combustion of sludge/solids	81	23	0	8**	0	9	0	41
Mercury retorting	<1	0	0	0	0	0	0	<1
Neutralization	36	0	0	0	0	0	0	36
Secondary lead smelting	37	0	0	0	0	0	0	37
Stabilization	750	4	0	263	0	4	1	478
Thermal recovery	0	0	0	0	0	0	0	0
Thermal recovery of cadmium batteries	<1	0	0	0	0	0	0	<1
Vitrification	0	0	0	0	0	0	0	0
Wet-air oxidation	<1	0	0	0	0	0	0	<1
Wet-air oxidation folloed by carbon adsorption	<1	0	0	0	0	0	0	<1
Wet-air oxidation folloed by chemical precipitation	<1	0	0	0	0	0	0	<1

Note: Quantities of less than one million gallons are neither added nor subtracted from available/required quantities.

* Third Third California List HOC volumes are included in required capacity for the Third Third final rule.

**Volume of waste not granted a variance. Total regulated volume requiring the specified technology includes reported volume plus volumes granted a two-year national capacity variance.

Table 2-20 presents estimates of the volume of Third Third promulgated wastes land disposed annually, by management practice and by type of land disposal unit. These estimates include the entire volume of any waste stream, for both single waste streams and waste groups, if the waste stream contained any Third Third promulgated waste but no solvent, or First or Second Third waste for which a standard has been finalized. The estimates also include volumes for waste streams containing soft hammered First and Second Third wastes for which treatment standards are being promulgated today, as well as Third Third promulgated wastes previously restricted as California list HOCs.

The volume of land disposed Third Third promulgated wastes requiring alternative commercial treatment capacity is less than the volume of Third Third promulgated wastes land disposed. This is because EPA has assumed that the 77 million gallons that were placed in short-term storage in waste piles do not require alternative treatment capacity because they are treated or disposed of elsewhere (although they may require alternative storage capacity; for more detail on the approach for "stored only" waste volumes, see Subsection 4.1.1). Furthermore, the facility-level waste treatability and technology capacity analyses conducted on Third Third promulgated wastes being land disposed determined that 79 million gallons of these wastes either had already been treated or could be treated onsite using the BDAT technology and therefore do not require alternative commercial treatment capacity.

Based on this analysis, EPA estimates that 5,546 million gallons of Third Third promulgated wastes will require alternative commercial treatment capacity. This volume includes 30 million gallons of soils, which are discussed in a separate section of this document; therefore, it is estimated that 5,516 million gallons of nonsoil Third Third promulgated wastes will require alternative commercial treatment capacity. Finally, EPA estimates that treatment of the 5,546 million gallons will generate 86 million gallons of waste residuals that will require additional alternative treatment capacity.

(2) Surface Disposed Third Third Wastes

Table 2-21 presents the estimates of available commercial capacity applicable to surface disposed Third Third promulgated wastes. The amount of available commercial capacity presented is that amount remaining after

Table 2-20 Overview of Third Third Promulgated Wastes

Land disposal method	Volume (million gallons/year)
Storage:	
Waste piles	77
Surface impoundments	5
Treatment:	
Waste piles	30
Surface impoundments	22
Disposal:	
Landfills	349
Land treatment	81
Surface impoundments	52
Underground injected	5,086
	5,701[a]

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[a] Numbers do not add exactly due to rounding.

accounting for previous land disposal restrictions (see Table 2-19). Table 2-21 also shows the estimates of the volume of surface disposed Third Third promulgated wastes that will require alternative commercial treatment recovery capacity as a result of this final rule (i.e., required capacity excluding soil and debris).

A comparison of required and available treatment/recovery capacity shows adequate capacity for most of the surface disposed Third Third promulgated wastes. However, EPA has determined that insufficient capacity currently exists for some volumes of surface-disposed Third Third promulgated wastes. Insufficient capacity exists for the following technologies: acid leaching followed by chemical precipitation, sludge/ solid combustion, mercury retorting, thermal recovery, and vitrification. Consequently, EPA is promulgating a national capacity variance for D009, K106, P065, P092, and U151 low mercury nonwastewaters; F039 multi-source leachate nonwastewaters; K048, K049, K050, K051, and K052 nonwastewaters; D009, K106, P065, P092, and U151 high mercury nonwastewaters; D008 lead acid batteries in storage areas prior to secondary smelting; P087 wastewaters and nonwastewaters; and D004, K031, K084, K101, K102, P010, P011, P012, P036, P038, and U136 nonwastewaters. EPA is granting these wastes a two-year national capacity variance, except for K048-K052 nonwastewaters. EPA is granting K048-K052 petroleum-refining nonwastewaters a six-month national capacity variance.

EPA is not promulgating a national capacity variance for any other surface-disposed Third Third promulgated wastes. Section 3.1 contains a detailed capacity analysis for each Third Third promulgated waste code.

(3) Underground Injected Wastes Included in Third Third Rule

Table 2-22 presents the amount of required and available commercial treatment recovery capacity for underground injected Third Third promulgated wastes. The amount of available commercial capacity presented is that amount remaining after accounting for surface-disposed Third Third promulgated wastes.

Table 2-21 Summary of Capacity Analysis for Third Third Promulgated Wastes (millions of gallons/yr.)[a]

Technology	Available Capacity	Required Capacity	Variance
Acid Leaching Followed by Chemical Precipitation	0	3	Yes[b]
Alkaline Chlorination	7	6	No
Alkaline Chlorination Followed by Chemical Precipitation	6	2	No
Biological Treatment	47	<1	No
Biological Treatment Followed By Chemical Precipitation	14	<1	No
Chemical Oxidation Followed By Chemical Precipitation	28	7	No
Chemical Oxidation Followed By Chromium Reduction and Chemical Precipitation	2	2	No
Chemical Precipitation	339	25	No
Chromium Reduction Followed By Chemical Precipitation	96	85	No
Combustion of Liquids	237	16	No
Combustion of Sludge/Solids	41	213	Yes[c]

[a] Volumes include First and Second Third soft hammer waste, and multi-source leachate, but do not include underground injected waste, soils/debris, or radioactive wastes.

[b] EPA is granting a variance for D009, K106, P065, P092, and U151 low mercury nonwastewaters requiring acid leaching followed by chemical precipitation.

[c] EPA is granting a variance for F039 multi-source leachate nonwastewaters, and K048, K049, K050, K051, and K052 nonwastewaters requiring either sludge or solid combustion.

Table 2-21 Summary of Capacity Analysis for Third Third Promulgated Wastes (millions of gallons/yr.) (continued)

Technology	Available Capacity	Required Capacity	Variance
Mercury Retorting	<1	3	Yes[d]
Neutralization	36	22	No
Secondary Smelting[e]	37	2	No
Stabilization	478	158	No
Thermal Recovery[f]	0	<1	Yes[g]
Thermal Recovery of Cadmium Batteries	<1	<1	No
Vitrification	<0	22	Yes[h]

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[d] EPA is granting a capacity variance to D009, K106, P065, P092, and U151 high mercury nonwastewaters requiring mercury retorting.

[e] EPA is granting a two-year national capacity variance to lead-acid batteries in storage areas.

[f] Excluding secondary smelting of lead wastes.

[g] EPA is granting a capacity variance to P087 wastewasters and nonwastewaters requiring thermal recovery.

[h] EPA is granting a capacity variance to D004, K031, K084, K101, K102, P010, P011, P012, P036, P038, and U136 nonwastewaters requiring vitrification.

Table 2-22 Summary of Capacity Analysis for Underground Injected Third Third Promulgated Wastes (millions of gallons/yr.)[a]

Technology	Available Capacity	Required Capacity	Variance
Acid Leaching Followed By Chemical Precipitation	0	<1	Yes
Alkaline Chlorination	<1	48	Yes
Alkaline Chlorination Followed By Chemical Precipitation	4	<1	No
Biological Treatment	47	2	No
Biological Treatment Followed By Chemical Precipitation	13	15	Yes
Chemical Oxidation Followed By Chemical Precipitation	21	1,684	Yes
Chemical Oxidation Followed By Chromium Reduction and Chemical Precipitation	<1	195	Yes
Chemical Precipitation	314	119	No
Chromium Reduction Followed By Chemical Precipitation	9	239	Yes
Combustion of Liquids	219	54	No
Mercury Retorting	<.01	<.02	Yes
Neutralization	14	1,638	Yes
Stabilization	305	4	No
Wet-Air Oxidation	<1	1,027	Yes
Wet-Air Oxidation Followed By Carbon Adsorption	<1	<1	No

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[a] Volumes include First and Second Third soft hammer waste, and multi-source leachate.

The table shows shortfalls in available capacity for acid leaching followed by chemical precipitation, alkaline chlorination, biological treatment followed by chemical precipitation, chemical oxidation followed by chemical precipitation, chemical oxidation followed by chromium reduction and chemical precipitation, chromium reduction followed by chemical precipitation, mercury retorting, neutralization, and wet-air oxidation. As a result, EPA is granting a two-year national capacity variance to D003 cyanide wastewaters and nonwastewaters; D003 sulfide wastewaters and nonwastewaters; D003 explosive/ reactive wastewaters and nonwastewaters; D007 wastewaters and nonwastewaters; D009 nonwastewaters; D002 wastewaters and nonwastewaters; K011 and K013 wastewaters and K014 wastewaters and nonwastewaters; and F039 multi-source leachate wastewaters.

EPA is not granting a national capacity variance for any other underground injected Third Third promulgated wastes.

(4) Soil and Debris

Table 2-23 presents the amount of required and available commercial treatment recovery capacity for soil and debris wastes. The amount of available commercial capacity presented is that amount remaining after accounting for surface-disposed and underground injected Third Third promulgated wastes.

The table shows shortfalls in available capacity for incineration, inorganic solids debris treatment, mercury retorting, and vitrification. EPA is therefore promulgating an extension of the effective date for certain contaminated soil and debris for which the treatment standards promulgated today are based on incineration, inorganic solids debris treatment, mercury retorting, or vitrification. RCRA section 3004(h) (2) allows the Administrator to grant an extension to the effective date based on the earliest date on which adequate alternative capacity will be available, but not to exceed two-years "...after the effective date of the prohibition which would otherwise apply under subsection (d), (e), (f), or (g)." For First Third and Second Third wastes that have heretofore been subject to the "soft hammer" provisions but for which treatment standards are being promulgated today, EPA is interpreting the statutory language "...effective date of the

Table 2-23 Summary of Capacity Analysis for Third Third Promulgated Soil and Debris Wastes (millions of gallons/yr.)[a]

Technology	Available Capacity	Required Capacity	Variance
Alkaline Chlorination	<1	<1	No
Beryllium Recovery	<1	<1	No
Chemical Oxidation Followed By Chromium Reduction and Chemical Precipitation	<1	<1	No
Chromium Reduction and Chemical Precipitation	47	2	No
Incineration of Sludge/Solids	0	8	Yes
Inorganic Solids Debris Treatment	0	2	Yes
Mercury Retorting	<1	4	Yes
Neutralization	14	<1	No
Secondary Smelting	35	<1	No
Stabilization	301	12	No
Vitrification	0	<1	Yes

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[a] Volumes include First and Second Third soft hammer waste, and multi-source leachate.

prohibition that would otherwise apply" to be the date treatment standards are promulgated for these wastes (i.e., May 8, 1990), rather than the date on which "soft hammer" provisions took effect (i.e., August 8, 1988, and June 8, 1989, respectively). EPA finds this the best interpretation for two reasons. Extensions of the effective date are based on the available capacity of the BDAT for the waste, so it is reasonable that such an extension begin on the date on which treatment standards based on performance of the BDAT are established. Furthermore, EPA does not intend, in effect to penalize generators of First Third and Second Third wastes by allowing less time (i.e., 28 months and 37 months, respectively) for the development of needed capacity, while generators of Third Third wastes in the same treatability group are allowed the maximum 48 months (assuming capacity does not become available at an earlier date). The promulgated capacity extension would therefore commence for First, Second, and Third Third wastes on May 8, 1990, and would extend (at maximum) until May 8, 1992.

For the purpose of determining whether a contaminated material is subject to this capacity extension, soil is defined as materials that are primarily geologic in origin, such as silt, loam, or clay, and that are indigenous to the natural geological environment. In certain cases, soils will be mixed with liquids or sludges. EPA will determine on a case-by-case basis whether all or portions of such mixtures should be considered soil (52 FR 31197, November 8, 1986).

Debris is defined as materials that are primarily non-geologic in origin such as grass, trees, stumps, shrubs, and manmade materials (e.g., concrete, clothing, partially buried whole or crushed empty drums, capacitors, and other synthetic manufactured items).

Debris may also include geologic materials (1) identified as not indigenous to the natural environment at or near the site, or (2) identified as indigenous rocks exceeding a 9.5 mm sieve size that are greater than 10 percent by weight, or that are at a total level that, based on engineering judgement, will affect performance of available treatment technologies. In many cases, debris will be mixed with liquids or sludges. EPA will determine on a case-by-case basis whether all or portions of such mixtures should be considered debris.

Analysis of the TSDR Survey data indicated that a volume of approximately 21 million gallons of soil contaminated with wastes subject to this proposal were land disposed in 1986. However, the Superfund remediation program has expanded significantly since that time. Plans for remediation at Superfund sites indicate that the excavation of soil and debris requiring treatment (including incineration and subsequent land disposal) will be far greater in 1990 than in 1986. Because of the major increase in the Superfund remediation program, EPA believes that capacity is still not adequate for combustion of Third Third contaminated soil and debris. In addition, the TSDR Survey indicates that inadequate capacity exists for soils requiring incineration or mercury retorting. A two-year extension of the effective date is promulgated for Third Third contaminated soil and debris for which BDAT is incineration, inorganic solids debris treatment, mercury retorting, or vitrification.

EPA notes that if soil and debris are contaminated with Third Third prohibited wastes whose treatment standard is based on incineration and also with other prohibited wastes whose treatment standard is based on a non-combustion type of technology, the soil and debris would remain eligible for the national capacity variance. This is because the contaminated soil and debris would still have to be treated by some form of combustion technology that EPA has evaluated as being unavailable at present. However, there is one exception to this principle. If the soil and debris are contaminated with a prohibited waste (or wastes) that is no longer eligible for a national capacity extension, such as certain types of prohibited solvent wastes, then the soil and debris would have to be treated to meet the treatment standard for that prohibited waste (or wastes). Any other interpretation would result in EPA's extending the date of prohibition beyond the dates established by Congress, and therefore beyond EPA's legal authority.

(5) Mixed Radioactive Wastes

Table 2-24 presents the amount of required and available treatment and recovery capacity for mixed radioactive wastes. The table shows shortfalls in available capacity for stabilization, macroencapsulation, combustion, stabilization, neutralization, vitrification, alkaline chlorination, alkaline chlorination followed by chemical precipitation, treatment of reactives, metals recovery, amalgamation, chromium reduction

Table 2-24
Summary of Capacity Analysis for Mixed Radioactive Wastes
(millions of gallons/yr.)

Technology	Available Capacity	Required Capacity	Variance
Stabilization	2.8	63.6	Yes
Macroencapsulation	0	<0.2	Yes
Combustion			
- Liquids	0	<0.1	Yes
- Sludge/solids	0	1.6	Yes
Neutralization	0.2	26.2	Yes
Vitrification	0	14	Yes
Alkaline Chlorination	0	0.8	Yes
Alkaline Chlorination Followed by Chemical Precipitation	0	0.5	Yes
Alkaline Chlorination Followed by Stabilization of Metals	0	8.1	Yes
Treatment of Reactives	0	<0.1	Yes
Metals Recovery	0	0.2	Yes
Amalgamation	0	<0.1	
Chromium Reduction Followed by Chemical Precipitation	0	<0.1	Yes
Chemical Precipitation	0	<0.1	Yes
Sulfide Precipitation	0	51.6	Yes
Soil and Debris	0	193	Yes

followed by chemical precipitation, chemical precipitation, and sulfide precipitation. The table also shows a capacity shortfall for soil and debris contaminated with mixed radioactive wastes. EPA is therefore granting a two-year national capacity variance for First Third, Second Third, and Third Third mixed radioactive wastes.

EPA has defined a mixed radioactive as any matrix containing a RCRA hazardous waste and a radioactive waste subject to the Atomic Energy Act (53 FR 37045, 37046, September 23, 1988). Regardless of the type of radioactive constituents that these wastes contain (e.g., high-level, low-level, or transuranic), they are subject to RCRA hazardous waste regulations, including the land disposal restrictions.

Radioactive wastes that are mixed with spent solvents, dioxins, or California list wastes are subject to the land disposal restrictions already promulgated for those hazardous wastes. EPA has determined, however, that radioactive wastes that are mixed with First Third and Second Third wastes, will be included in the Third Third rulemaking (40 CFR 268.12(c)). Thus, today's rule addresses radioactive wastes that contain First Third, Second Third, and Third Third wastes.

The Department of Energy (DOE) provided data on the generation and treatment of mixed radioactive wastes at 21 DOE facilities. Information in Table 2-24 is based on the DOE data. Other sources for non-DOE mixed radioactive wastes included the TSDR Survey, Generator Survey, published studies of mixed radioactive wastes, surveys and reports for states and interstate compacts for managing low-level mixed radioactive wastes, and telephone contacts with government representatives and industry officials. Appendix B describes these data sources in more detail.

Appendix B of this background document also provides a detailed discussion of how these data were analyzed. In general, the first step in the analysis was a DOE facility-by-facility analysis of mixed radioactive waste generation. Generation numbers were developed in groups based on BDATs or equivalent treatment technologies. For each treatment technology, the quantity of mixed radioactive wastes requiring treatment included the annual generation rate and the amount of mixed radioactive waste in storage requiring treatment.

Once generation numbers were developed, they were compared to available DOE on-site treatment capacity to determine the net treatment capacity for each technology at each DOE facility. With this step accomplished, aggregates of net treatment capacity for each treatment technology were developed for all of DOE, which indicated a capacity shortfall.

Analysis of non-DOE mixed radioactive waste generation could not be performed in a detailed systematic manner, as data presentation and definition varied greatly from source to source. Available data were analyzed to determine the types and quantities of mixed radioactive wastes generated at non-DOE facilities. As a result of this analysis, EPA determined that the non-DOE generation of mixed radioactive wastes would have no significant impact on the outcome of the capaacity analysis for the Third Third final rule, as the quantity of non-DOE mixed radioactive wastes requiring treatment is less than one percent of the quantity generated at DOE facilities. In addition, RCRA waste codes found in non-DOE mixed radioactive wastes are also found in DOE mixed radioactive wastes, so no additional treatability groups had to be identified.

No significant non-DOE treatment capacity was identified in the analysis. Consequently, there is currently a capacity shortfall for non-DOE mixed radioactive wastes.

Because a capacity shortfall currently exists for DOE and non-DOE mixed radioactive wastes, EPA is granting a national capacity variance for all surface-disposed mixed radioactive wastes. EPA has no information on the underground injection of mixed radioactive wastes. Consequently, EPA is not granting a national capacity variance for mixed radioactive wastes that are underground injected.